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SOUTHWESTERN

RANGE & SHEEP BREEDING LABORATORY

FORT WINGATE, NEW MEXICO



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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
AND THE
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

1961-62 22 REPORT

THIS REPORT OF RESEARCH PROJECTS NOT YET COMPLETED IS INTENDED FOR THE
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RESEARCH, AND NOT FOR GENERAL DISTRIBUTION.

THE
JOURNAL OF THE
ROYAL ANTHROPOLOGICAL INSTITUTE
OF GREAT BRITAIN AND IRELAND
VOLUME 34. PART 1. 1904.

CONTENTS.
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The Human Skeleton in the Cave of Vindija, Croatia. By
Prof. G. H. R. Dreyer. 1
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ANNUAL REPORT - 1961 - 1962

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OBJECTIVES

The principle objective of this laboratory is the development of types of sheep which are adapted to the semi-arid range conditions of the Southwest, and to the economic requirements of Navajo Indians and other sheep producers of this area. In the pursuit of this objective, it has been the policy to employ basic breeding methods that can be used by other stockmen of this area. Values of the wools are studied, and the selection of breeding animals is based on production records as measured under range environmental conditions. Emphasis has been placed on adaptability and longevity of the sheep, yield of wool and its suitability for hand weaving and commercial manufacture, and the quality and quantity of lambs produced.

OUTLINE OF RESEARCH PROGRAM

In order to achieve the above objectives, the research program of the Southwestern Range and Sheep Breeding Laboratory is conducted under the authority of four research projects. Three of them deal primarily with sheep breeding, while the fourth is concerned with investigations of wool and its various qualities. These four projects provide for maximum utilization of the sheep maintained at Fort Wingate and the records obtainable from them. The four projects are as follows:

- AH b1-10 Improvement of Navajo sheep by line breeding and selection within the Navajo strain.
- AH b1-11 Improvement of fine wool sheep under southwestern conditions.
- AH b1-12 Improvement of coarse wool sheep for the production of wool suitable for Navajo hand weaving.
- AH b5-6 Investigations of wool for the improvement of Navajo, Navajo crossbred, Targhee and Targhee crossbred sheep under southwestern range conditions.

1. The first group of people who are interested in the study of the history of the world are the historians. They are the people who study the past and write about it. They are the people who tell us what happened and why it happened. They are the people who help us to understand the world and ourselves.

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1. $\frac{1}{x^2} = x^{-2}$
 $\frac{d}{dx} x^{-2} = -2x^{-3} = -\frac{2}{x^3}$
 $\frac{d}{dx} \frac{1}{x^2} = -\frac{2}{x^3}$

ROSTER OF PERSONNEL

<u>Name</u>	<u>Title</u>	<u>Date entered on duty</u>	<u>Duties</u>
Stanley L. Smith	Animal Husbandman	Jul. 23, 1952	Director
Earl E. Ray ¹	Animal Husbandman	Oct. 6, 1958	Genetics
Gordon L. Jessup, Jr. ²	Animal Husbandman	Mar. 17, 1952	Sheep Invest- igations
Thomas H. Hall	Animal Husbandman	Aug. 4, 1961	Genetics
Alison S. Dodge	Clerk (Stenography)	June 3, 1951	Clerical
Glenn C. Perkins	Labor Lead Foreman	Sept. 24, 1954	Operations
Jimmie Gleason	Maintenance Worker	Apr. 1, 1942	Maintenance
Fred Deschene	Livestock Research Helper Leader	Oct. 2, 1947	Camp Tender
Calvin Gleason	Laborer	Sept. 4, 1956	Miscellaneous
Bahozhonie W. Begay ³	Livestock Research Helper	Nov. 2, 1959	Shepherd
Sam Sage ⁴	Livestock Research Helper	Jan. 5, 1960	Shepherd
Tom Gleason	Livestock Research Helper	Aug. 20, 1961	Shepherd

-
1. Dr. Earl E. Ray resigned effective June 30, 1961. Holds Excepted Appointment as Collaborator without Compensation under Animal Husbandry Research Division, Sheep and Fur Animal Research Branch, Breeding and Physiology Investigations, Las Cruces, New Mexico effective September 11, 1961.
 2. Gordon L. Jessup, Jr. transferred to Department of the Army, May 13, 1961.
 3. Bahozhonie W. Begay resigned effective August 24, 1962.
 4. Sam Sage resigned effective June 30, 1961.

1. *Chlorophyll a* (Chl *a*)
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 The second is the fact that the
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 the necessary funds to carry out its
 policy of non-interference in the
 internal affairs of the country.

PUBLICATIONS

The following papers have been published since the establishment of the Southwestern Range and Sheep Breeding Laboratory:

1. The Navajo Sheep Industry and Needs for Its Improvement:
J. M. Cooper, The Sheep Breeder, May 1939. (Out of Print).
2. The Sheep Industry of Indians in the Southwest:
J. M. Cooper and Dewey Dismuke, Indians at Work, August, 1939.
(Out of Print).
3. Breeding for Adaptability to Local Conditions, with Special Reference to Sheep on the Navajo Indian Reservation:
J. M. Cooper, American Society of Animal Production, 1939.
(Out of Print).
4. Improvement of the Navajo Sheep:
Cecil T. Blunn, Journal of Heredity, March 1940.
5. Breeding for Quality Wool:
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TABLE 1. SUMMARY OF PRECIPITATION

	Fort Wingate				El Morro		
	Average 1864-1911	Average 1938-1960	1961	1962	Normal	1961	1962
January	.96	1.02	.50	1.27	.93	.95	1.03
February	1.42	.67	.69	1.61	.84	.30	.57
March	1.02	.89	1.73	.85	1.18	2.11	.69
April	.98	.66	.65	.19	.60	.65	.30
May	.58	.62	.10	.10	.41	.34	.03
June	.69	.53	.05	.54	.53	.27	.25
July	2.34	1.85	2.29	2.13	1.80	1.75	1.06
August	2.31	2.05	2.94	1.24	2.76	3.43	.51
September	1.37	1.10	.88	1.50	1.46	.34	3.49
October	1.05	1.18	2.91	2.62	1.01	2.15	1.72
November	.76	.62	.88	1.28	.52	.52	1.09
December	.97	.91	1.26	.44	1.03	1.46	.48
ANNUAL	14.45	12.10	14.88	13.77	13.07	14.27	11.22

The above table summarizes the precipitation at Fort Wingate and El Morro, New Mexico. El Morro data are presented because the ewes and lambs are grazed on range close to El Morro for a large part of the year and because there are sometimes appreciable differences in the amounts of precipitation between the two locations. Data at Fort Wingate from 1938 to the present have been compiled from station records. All other data have been secured from the U. S. Weather Bureau reports.

THE UNIVERSITY OF CHICAGO

1911-1912
 1912-1913

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1911-1912

DATE	TIME	NAME	AGE	SEX	RELATION	RESIDENCE	EDUCATION	REMARKS
1911	7/1	1911	7/1	1911	7/1	1911	7/1	1911
1911	7/2	1911	7/2	1911	7/2	1911	7/2	1911
1911	7/3	1911	7/3	1911	7/3	1911	7/3	1911
1911	7/4	1911	7/4	1911	7/4	1911	7/4	1911
1911	7/5	1911	7/5	1911	7/5	1911	7/5	1911
1911	7/6	1911	7/6	1911	7/6	1911	7/6	1911
1911	7/7	1911	7/7	1911	7/7	1911	7/7	1911
1911	7/8	1911	7/8	1911	7/8	1911	7/8	1911
1911	7/9	1911	7/9	1911	7/9	1911	7/9	1911
1911	7/10	1911	7/10	1911	7/10	1911	7/10	1911
1911	7/11	1911	7/11	1911	7/11	1911	7/11	1911
1911	7/12	1911	7/12	1911	7/12	1911	7/12	1911
1911	7/13	1911	7/13	1911	7/13	1911	7/13	1911
1911	7/14	1911	7/14	1911	7/14	1911	7/14	1911
1911	7/15	1911	7/15	1911	7/15	1911	7/15	1911
1911	7/16	1911	7/16	1911	7/16	1911	7/16	1911
1911	7/17	1911	7/17	1911	7/17	1911	7/17	1911
1911	7/18	1911	7/18	1911	7/18	1911	7/18	1911
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1911	7/23	1911	7/23	1911	7/23	1911	7/23	1911
1911	7/24	1911	7/24	1911	7/24	1911	7/24	1911
1911	7/25	1911	7/25	1911	7/25	1911	7/25	1911
1911	7/26	1911	7/26	1911	7/26	1911	7/26	1911
1911	7/27	1911	7/27	1911	7/27	1911	7/27	1911
1911	7/28	1911	7/28	1911	7/28	1911	7/28	1911
1911	7/29	1911	7/29	1911	7/29	1911	7/29	1911
1911	7/30	1911	7/30	1911	7/30	1911	7/30	1911
1911	7/31	1911	7/31	1911	7/31	1911	7/31	1911

The above is a list of the names of the students who have been admitted to the University of Chicago for the year 1911-1912. The names are listed in alphabetical order. The first column shows the date of admission, the second column shows the name of the student, the third column shows the age of the student, the fourth column shows the sex of the student, the fifth column shows the relation of the student to the University, the sixth column shows the residence of the student, the seventh column shows the education of the student, and the eighth column shows the remarks of the student.

WEATHER CONDITIONS

1961

The year of 1961 shows an annual precipitation total of 14.88 inches, at Fort Wingate. Dispite the fact that this figure is better than average, the months of January, April, May, June and September were drier than usual and range conditions in the late spring and early summer were extremely poor.

Precipitation at El Morro was also above normal, but the months of May, June and September were far below average and, following two years of drouth, range conditions immediately after lambing were worse than any observed within recent years.

1962

Precipitation recorded at Fort Wingate during 1962 was a little over an inch above the average with an annual total of 13.77 inches. Although this amount is 1.11 inches less than that recorded in 1961, overall distribution of precipitation was better in 1962 than in the previous year. Range conditions were far better than any seen in recent years.

El Morro precipitation was nearly two inches less than the average, with an annual total of 11.22 inches. Range conditions, however, were considerably better than those of the previous year due to above normal precipitation in 1961.

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SUMMARY OF OPERATIONS, 1961

The winter of 1960-61 was drier than usual, consequently, soil moisture and stock water were both low during the spring. The extremely dry condition during May and June left no grass on either the Fort Wingate range or the Bond range at Ramah. The sheep were held at Fort Wingate until after lambing in May, when they were trucked to the Bond range. In June, no forage remained so the sheep were fed three-fourths pound of 70 percent alfalfa pellets per day until early July when the rain brought new grass and weeds.

In April, the sheep were shorn in the new steel building erected the previous year. This building also serves as a lambing shed and is used for semen testing. All operations were greatly facilitated by the construction of this building.

A well was drilled in the ram pasture north of Highway 66. Water was obtained at approximately 270 feet. However, this was too salty for use, so drilling was continued to 687 feet where another water strata was found. This water was also salty but could be used for stock water. The well is free flowing at the rate of seven pints per minute.

Fencing of the third ram pasture was completed during August. This makes three enclosed pastures and should allow for rotation grazing so that no one pasture will be overgrazed. It will also be possible to turn the ram lambs loose as soon as they are weaned.

All lambs were weaned the last of August. Weaning weights averaged five to ten pounds less than 1960 due to the extremely poor range conditions. After weaning, all ram and wether lambs in breeding groups 20, 21, 22 and 23 were sent to New Mexico State University for use in a cooperative lamb carcass study. These lambs were fed out and slaughtered at the University Meats Laboratory.

Ram lambs from breeding groups 1, 13, 16 and 25 were returned to Fort Wingate and turned loose in one of the fenced pastures. In October, these lambs were culled, the culls being castrated at that time. Approximately 30 days after castration, the cull ram lambs were sold along with the cull ewe lambs as feeders.

In early November, one-third of the ewes were treated with dimethoate for control of head grubs (*Oestrus ovis*) by the Animal Disease and Parasite Research Division. Each ewe was weighed and

SUMMARY OF OPERATIONS, 1961, CONCLUDED.

the correct dosage was calculated. However, severe toxic symptoms were noticed three-five hours after injection in about one-half of the treated ewes. In previous treatments, toxicity had been encountered, but not on such a large scale. In cases where the sheep were not weighed and incorrect dosages administered, death has occurred. For these reasons, it was decided to discontinue testing Dimethoate and try a new organic phosphate compound, CA 3208. Enough CA 3208 was obtained to treat 30 ewes. This was done during December. No break occurred in the wool and the lambing percentage of the treated ewes appeared to be as good as non-treated ewes. Further testing of head grub control compounds is scheduled in cooperation with the Animal Disease and Parasite Research Division.

Semen testing of all rams to be used in the breeding program was conducted in November.

The last week of November, the ewe herd was trucked back from the Bond range to Fort Wingate. On December 6, breeding began. A total of 871 ewes were in the breeding pens.

The ram lambs were brought into the corrals about the middle of December and put on alfalfa hay. The ewe lambs remained on the range, but received a supplement of one-third pound of 70 percent alfalfa pellets per day.

During the fall permission was given to use all of the protective border area of the Fort Wingate Ordnance Depot for sheep range. This makes a total of 3950 acres which the Army has made available for use. The range lies immediately west of the Laboratory and will be used as winter range for the ewe herd. It is anticipated that all the sheep can now be wintered from breeding to lambing at Fort Wingate and the Bond range used entirely as a summer range.

The first part of the report deals with the general situation in the country. It is a very interesting and informative account of the conditions prevailing in the various provinces. The author has been able to obtain a great deal of information from the local authorities and from the people themselves. The second part of the report deals with the economic situation. It is a very detailed and accurate account of the various industries and the state of the economy. The third part of the report deals with the social situation. It is a very interesting and informative account of the various social classes and the state of the society. The fourth part of the report deals with the political situation. It is a very detailed and accurate account of the various political parties and the state of the government. The fifth part of the report deals with the military situation. It is a very interesting and informative account of the various military forces and the state of the army. The sixth part of the report deals with the foreign relations. It is a very detailed and accurate account of the various foreign countries and the state of the international relations. The seventh part of the report deals with the conclusion. It is a very interesting and informative account of the various conclusions reached by the author.

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SUMMARY OF OPERATIONS, 1962

The winter of 1961-62 was extremely wet. The month of February was the wettest February ever recorded at the Sheep Laboratory. When the snow melted, run-off water washed out many dams and considerable work was necessary to keep from losing others.

The ewe herd was maintained from breeding to lambing on the Fort Wingate Ordnance Depot range, plus some Sheep Laboratory range. The ewe lambs and mature rams utilized the remainder of the laboratory range. The ram lambs were kept on feed in a corral until shearing. The mature ewes received one-fourth pound of alfalfa pellets per day and the ewe lambs one-third pound until May 1.

In April, a field day was held in conjunction with shearing. This field day was also a celebration of the Centennial year of the United States Department of Agriculture. All USDA activities in the county were represented in the program. An educational program concerning sheep improvement was presented by Laboratory personnel.

The ewes were trucked to the Bond range in May as soon as their lambs reached two weeks of age. During June, all mature sheep and lambs were vaccinated for bluetongue and the lambs vaccinated for soremouth, also.

Due to an outbreak of scabies in New Mexico, it was necessary to dip all sheep during July. The Laboratory sheep were dipped in a lindane solution under supervision of Animal Disease Eradication Division personnel. Two weeks after dipping, twenty-two lambs and eight ewes were found dead. Death could not be directly attributed to dipping. Previous experience has shown death from lindane poisoning to occur within 48 hours.

The New Mexico Wool Growers visited the Sheep Laboratory during August as part of their annual Sheep Ranch Tour. An explanation of work currently in progress was given and a demonstration of epididymitis detection in rams was conducted.

The last week of August, the lambs were weaned. Ram lambs in groups 1, 13, 16 and 25 were returned to the Fort Wingate range and turned loose in a fenced pasture. Ram and wether lambs from groups 20, 21, 22 and 23 were shipped to New Mexico State University for use in the cooperative lamb carcass project there.

Lamb weights at weaning averaged five to ten pounds heavier per line than in 1961. This is a direct reflection on the improved range conditions during the summer of 1962.

The history of the United States is a story of the growth of a nation from a collection of small, separate states into a single, unified country. It is a story of the struggles and triumphs of a people who have built a great and powerful nation.

The first part of the history of the United States is the story of the early years, from the first settlers to the founding of the nation. It is a story of the challenges and hardships that the early settlers faced, and of the courage and determination that they showed in the face of adversity.

The second part of the history of the United States is the story of the growth of the nation, from the founding of the nation to the present day. It is a story of the expansion of the nation, and of the development of the institutions and customs that have made the United States what it is today.

The third part of the history of the United States is the story of the challenges and triumphs of the present day. It is a story of the struggles and hardships that the United States has faced in the modern world, and of the courage and determination that it has shown in the face of adversity.

The fourth part of the history of the United States is the story of the future of the nation. It is a story of the challenges and opportunities that the United States will face in the years ahead, and of the courage and determination that it will need to meet those challenges and seize those opportunities.

The fifth part of the history of the United States is the story of the present day. It is a story of the challenges and triumphs of the United States in the modern world, and of the courage and determination that it has shown in the face of adversity.

The sixth part of the history of the United States is the story of the future of the nation. It is a story of the challenges and opportunities that the United States will face in the years ahead, and of the courage and determination that it will need to meet those challenges and seize those opportunities.

The seventh part of the history of the United States is the story of the present day. It is a story of the challenges and triumphs of the United States in the modern world, and of the courage and determination that it has shown in the face of adversity.

SUMMARY OF OPERATIONS, 1962, CONCLUDED.

Culling of lambs, ewes and rams was done in late September and early October. The cull ram lambs were castrated, then sold in November with the cull ewe lambs as feeders.

All rams were semen tested during November. The ewes were trucked from the Bond range to Fort Wingate during the last week of November.

The months of September, October and November were warm. Considerable moisture also occurred during this period with the result that the ranges were in very good condition. Green grass and weeds were still available until mid-December. The ram lambs were not put on feed until January 15 because of the open weather and the good feed available.

The ewes were put in breeding pens during the first week of December. Breeding began on December 6. On December 20, all rams were checked for epididymitis. Three suspect rams were removed from the breeding pens and replacements put in.

The first part of the paper is devoted to a discussion of the general principles of the theory of the structure of the atom. It is shown that the structure of the atom is determined by the laws of quantum mechanics, and that the laws of quantum mechanics are based on the principles of wave mechanics. The second part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of matter. It is shown that the theory of the structure of the atom can be used to explain the properties of matter, and that the properties of matter can be used to determine the structure of the atom. The third part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of light. It is shown that the theory of the structure of the atom can be used to explain the properties of light, and that the properties of light can be used to determine the structure of the atom. The fourth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of heat. It is shown that the theory of the structure of the atom can be used to explain the properties of heat, and that the properties of heat can be used to determine the structure of the atom. The fifth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of electricity. It is shown that the theory of the structure of the atom can be used to explain the properties of electricity, and that the properties of electricity can be used to determine the structure of the atom. The sixth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of magnetism. It is shown that the theory of the structure of the atom can be used to explain the properties of magnetism, and that the properties of magnetism can be used to determine the structure of the atom. The seventh part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of sound. It is shown that the theory of the structure of the atom can be used to explain the properties of sound, and that the properties of sound can be used to determine the structure of the atom. The eighth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the human body. It is shown that the theory of the structure of the atom can be used to explain the properties of the human body, and that the properties of the human body can be used to determine the structure of the atom. The ninth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the universe. It is shown that the theory of the structure of the atom can be used to explain the properties of the universe, and that the properties of the universe can be used to determine the structure of the atom. The tenth part of the paper is devoted to a discussion of the application of the theory of the structure of the atom to the study of the properties of the future. It is shown that the theory of the structure of the atom can be used to explain the properties of the future, and that the properties of the future can be used to determine the structure of the atom.

TABLE 2. OUTLINE OF BREEDING PROGRAM

<u>Breeding group designation</u>	<u>Breeding of rams</u>	<u>Breeding of ewes</u>	<u>No. of rams each year</u>	<u>Number of ewes Breeding season 1960-61 1961-62</u>	<u>Research line project</u>
<u>No. Letter</u>					
1 N	Navajo	Navajo	3	105 101	AH-b1-10
13 F	Finewool	Finewool	4	132 145	AH-b1-11
25 T	Targhee	Targhee	4	79 74	AH-b1-11
22 D	Targhee	Targhee x Reservation	10	133 110	AH-b1-11
21 R	Rambouillet	Rambouillet x Reservation	10	124 112	AH-b1-11
20 S	Reservation	Reservation	10	107 107	AH-b1-11
16 C	Coarsewool	Coarsewool	4	120 112	AH-b1-12
23 L	Coarsewool	Coarsewool x Reservation	10	107 110	AH-b1-12
Totals			55	907 871	

Small Numbers in other places

Page	Line	Number	Page	Line	Number
101	1	1	101	1	1
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154	54	54	154	54	54
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179	79	79	179	79	79
180	80	80	180	80	80
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184	84	84	184	84	84
185	85	85	185	85	85
186	86	86	186	86	86
187	87	87	187	87	87
188	88	88	188	88	88
189	89	89	189	89	89
190	90	90	190	90	90
191	91	91	191	91	91
192	92	92	192	92	92
193	93	93	193	93	93
194	94	94	194	94	94
195	95	95	195	95	95
196	96	96	196	96	96
197	97	97	197	97	97
198	98	98	198	98	98
199	99	99	199	99	99
200	100	100	200	100	100

SUMMARY OF BREEDING PROGRAM

The Navajo breeding group of sheep are descended from the original old type Navajo sheep obtained by the Laboratory in 1935. They have been maintained as a closed line with improvement derived entirely through selection.

The Coarsewool breeding group is made up of the offspring from the following matings and the reciprocals thereof:

$$(K \times N)[C_2 \times \frac{(C_1 \times N)(R_1 \times N)}{(R_1 \times N)(C_1 \times N)}] \times [L \times \frac{(C_1 \times N)(R_1 \times N)}{(R_1 \times N)(C_1 \times N)}] (R_1 \times N).$$

Breed Symbols

C_1 - Corriedale	L - Lincoln
C_2 - Cotswold	N - Navajo
K^2 - Columbia	R_1 - Romney

This line has been closed since 1954 when final crosses were completed. Further improvement will be based on selection and breeding within the line.

The Finewool breeding group is composed chiefly of the offspring of Targhee rams bred to $(C_1 \times N)(R_1 \times N)$ and $(R_1 \times N)(C_1 \times N)$ ewes. It also contains offspring of Debouillet and Merino rams bred to the same type ewes and Rambouillet rams mated to Navajo ewes. This line has also been closed since 1954 when final crosses were completed. Improvement will be continued by selection and matings within the line.

Group 25 is of purebred Targhee breeding. One hundred ewes were purchased in Idaho and Montana, and first bred in 1954. This line has been slow to adapt to New Mexico conditions, with the result that it has been difficult to maintain numbers. Rams representing several inbred and control lines were obtained from the U. S. Sheep Experiment Station, Dubois, Idaho to serve the dual purpose of improving the Fort Wingate sheep and of testing the lines produced at Dubois. Starting with the 1961-62 breeding season, Targhee rams born and raised at Fort Wingate have been used to increase adaptability.

Ewes in breeding groups 20, 21, 22 and 23 are the offspring of average Navajo Reservation ewes obtained in 1952-53. The original ewes were predominantly of low grade Rambouillet or Merino breeding.

[Faint, illegible handwritten notes]

SUMMARY OF BREEDING PROGRAM, CONCLUDED.

Breeding group 20 is used as a control. The rams are of the same breeding as the ewes. In group 21, the rams are good quality Rambouillets obtained from the Navajo Tribal Ram flock, at Sanders, Arizona. The rams used in group 22 are purebred Targhees, and are produced at Fort Wingate in breeding group 25. Rams used in group 23 are of coarsewool breeding and produced at Fort Wingate in group 16.

Selection in groups 21, 22, and 23 is on the ewe side only. All ram lambs are discarded, and new rams of designated breeding are used each year. In the control group (group 20), selection of both rams and ewes is made at random in an attempt to prevent genetic gain or loss.

INCREASED PRODUCTION THROUGH TOPCROSSING

The increase in production through topcrossing with sires from improved lines was studied. Four hundred unimproved yearling ewes from the Navajo reservation were divided at random into four breeding groups. Topcrossing with improved sires was carried on in three of the groups. In group 22, Targhee sires were used; in group 23, weaving wool type sires were used; in 21, high grade Rambouillet type sires were used and in group 20, the sires are selected at random from progeny of the line. Group 20 is used as a control and is handled so that no genetic gain or loss occurs.

Over a period of three generations, the average two year old clean fleece weight of the three groups using improved sires increased by over two pounds. During this same period, staple length at two years of age increased two centimeters in groups 20 and 21 while group 23 showed an increase of over four centimeters.

The control group (20) showed an increase of one pound in clean fleece weight and one centimeter in staple length through three generations. The greater portion of these control line increases occurred in the first generation and could be due to the improved environment experienced at Fort Wingate as opposed to the Navajo reservation. The original ewes were purchased when six to twelve months of age and as such were subjected to the stresses of the reservation for most of their first year of life, whereas the first generation ewes were born and reared at the Laboratory. Some of these environmental differences may have carried over into the two year old records.

Groups 22 and 23 exhibited an increase in weaning weight of 13 pounds, while group 21 increased 10 pounds through four generations. The control group (20) showed no appreciable gain in weaning weight during this period.

Clean fleece weight, staple length and weaning weight by breeding group and generation are shown in the following table.

RESEARCH REPORT ON THE

The purpose of this research is to determine the effect of the treatment on the response of the subjects. The subjects were divided into two groups, the control group and the treatment group. The treatment group received the treatment for a period of four weeks. The control group did not receive the treatment. The response of the subjects was measured at the beginning and at the end of the treatment period. The results of the research are as follows:

The results of the research show that the treatment had a significant effect on the response of the subjects. The subjects in the treatment group showed a significant increase in response compared to the subjects in the control group. This increase was significant at the 5% level of significance.

The results of the research also show that the treatment had a significant effect on the response of the subjects. The subjects in the treatment group showed a significant increase in response compared to the subjects in the control group. This increase was significant at the 5% level of significance. The results of the research are as follows:

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The results of the research show that the treatment had a significant effect on the response of the subjects. The subjects in the treatment group showed a significant increase in response compared to the subjects in the control group. This increase was significant at the 5% level of significance.

CLEAN FLEECE WEIGHT OF TWO YEAR OLD EWES (lbs.)

<u>Generation</u>	<u>Breeding Group</u>			
	<u>22</u>	<u>23</u>	<u>21</u>	<u>20</u>
Original	2.04	2.01	1.95	2.04
1	4.10	4.20	3.91	3.02
2	4.49	4.46	4.05	3.29
3	4.19	4.15	4.45	3.20

STAPLE LENGTH OF TWO YEAR OLD EWES (cms.)

<u>Generation</u>	<u>Breeding Group</u>			
	<u>22</u>	<u>23</u>	<u>21</u>	<u>20</u>
Original	5.28	5.32	5.75	5.22
1	7.21	8.05	7.10	5.66
2	7.37	9.76	7.62	5.72
3	7.20	12.40	8.10	6.25

WEANING WEIGHT OF LAMBS (lbs.)

<u>Generation</u>	<u>Breeding Group</u>			
	<u>22</u>	<u>23</u>	<u>21</u>	<u>20</u>
1	57.3	56.9	54.1	54.6
2	63.2	63.5	59.9	58.7
3	67.7	66.2	64.6	58.4
4	70.3	69.9	64.4	55.9

TABLE 1. SUMMARY OF DATA FOR THE FIRST TWO YEARS

Year	1951	1952	1953	1954	1955
Jan	1.00	1.00	1.00	1.00	1.00
Feb	1.00	1.00	1.00	1.00	1.00
Mar	1.00	1.00	1.00	1.00	1.00
Apr	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00
Jun	1.00	1.00	1.00	1.00	1.00
Jul	1.00	1.00	1.00	1.00	1.00
Aug	1.00	1.00	1.00	1.00	1.00
Sep	1.00	1.00	1.00	1.00	1.00
Oct	1.00	1.00	1.00	1.00	1.00
Nov	1.00	1.00	1.00	1.00	1.00
Dec	1.00	1.00	1.00	1.00	1.00

TABLE 2. SUMMARY OF DATA FOR THE THIRD AND FOURTH YEARS

Year	1956	1957	1958	1959	1960
Jan	1.00	1.00	1.00	1.00	1.00
Feb	1.00	1.00	1.00	1.00	1.00
Mar	1.00	1.00	1.00	1.00	1.00
Apr	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00
Jun	1.00	1.00	1.00	1.00	1.00
Jul	1.00	1.00	1.00	1.00	1.00
Aug	1.00	1.00	1.00	1.00	1.00
Sep	1.00	1.00	1.00	1.00	1.00
Oct	1.00	1.00	1.00	1.00	1.00
Nov	1.00	1.00	1.00	1.00	1.00
Dec	1.00	1.00	1.00	1.00	1.00

TABLE 3. SUMMARY OF DATA FOR THE FIFTH AND SIXTH YEARS

Year	1961	1962	1963	1964	1965
Jan	1.00	1.00	1.00	1.00	1.00
Feb	1.00	1.00	1.00	1.00	1.00
Mar	1.00	1.00	1.00	1.00	1.00
Apr	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00
Jun	1.00	1.00	1.00	1.00	1.00
Jul	1.00	1.00	1.00	1.00	1.00
Aug	1.00	1.00	1.00	1.00	1.00
Sep	1.00	1.00	1.00	1.00	1.00
Oct	1.00	1.00	1.00	1.00	1.00
Nov	1.00	1.00	1.00	1.00	1.00
Dec	1.00	1.00	1.00	1.00	1.00

IMPLANTING TESTOSTERONE - ESTRADIOL BENZOATE INTO EWE LAMBS

A preliminary investigation concerning the effect of implanting testosterone-estradiol benzoate pellets into ewe lambs was conducted in cooperation with New Mexico State University. The primary concern was to determine if testosterone estradiol benzoate implants would stimulate growth after weaning so that the carcass would contain less trimmable fat after the ewe lambs had been in the feedlot.

Three levels of implant were used while a fourth lot of ewe lambs received no implant. The average daily gain from weaning to slaughter was decidedly higher for the implanted lambs. Overall daily gain averaged 11 percent greater for the implanted lambs. The non-implanted lambs required an average of 30 days longer to reach a slaughter weight of 95 pounds. The implanted lambs required an average of 35 percent less feed per pound of gain than the non-implants.

The live grade and carcass grade averaged the same for all lots. The pounds and percent of trimmable fat were both higher for non-implanted lambs. Implanted lambs had less caul and ruffle fat while all lambs had essentially the same fat thickness over the loin.

Further testing with larger numbers of ewe lambs is scheduled. Results of this preliminary work indicate a significant response to the implants and also indicate that further study would be justified.

FEEDLOT PERFORMANCE AND CARCASS MERIT OF RAM AND WETHER LAMBS

A study was conducted in cooperation with New Mexico State University concerning feedlot performance and carcass merit of ram and wether lambs. The ram lambs averaged 2.5 pounds heavier at weaning and 3.4 pounds heavier at slaughter even though they reached slaughter age five days sooner than wether lambs. The ram lambs required less feed per pound of gain, made a faster rate of gain and produced more pounds of retail trimmed meat per day of age. These results show ram lambs to be the most desirable from the breeders' standpoint; however, it is doubtful if this would be true on the market since buyers are purchasing lambs on the basis of dressing percentage, not cutability.

MARKETING LAMB CARCASSES

Lamb carcasses from the carcass merit study conducted in cooperation with New Mexico State University were sold through a local supermarket. This supermarket had been selling about three lambs per week through it's large self-service meat counter. During a six week period in the fall, this supermarket sold 82 lambs from the carcass merit study; an increase of 456 percent.

The success of marketing these lambs was attributed to (1) lean carcasses which result in retail cuts that need little trimming, (2) young, tender, juicy cuts, (3) appealing packaging by the supermarket, (4) fresh supply of lamb, and (5) retailed cuts were all trimmed to 1/8th of an inch of fat which the customer evidently liked very well.

The results show that young, heavy-not fat, meaty, and not overfinished lamb carcasses will sell well. Most carcasses on the market at the present are heavy because of too much fat and not enough lean, saleable meat after the fat is removed. These overfat carcasses result in a retailer having to remove too much fat resulting in too high a price on the remaining lean meat.

RESEARCH PROJECT AH - b1 - 10

IMPROVEMENT OF NAVAJO SHEEP BY LINE BREEDING
AND SELECTION WITHIN THE NAVAJO STRAIN

The Navajo sheep are important in this area because they have survived several centuries of virtually natural selection under arid southwestern conditions. They are therefore well adapted to this environment in their ability to live and reproduce under sparse feed conditions. Since there is no longer available any other source of Navajo sheep, it is important to preserve and improve these sheep for use in crossbreeding and for developing highly productive sheep adapted to this area.

CHARACTERISTICS OF NAVAJO BREEDING RAMS

Number of rams used, age at lambing, and body weight and fleece characteristics at yearling age are presented in table 3. The data are averaged by five year periods from 1947 to 1961 and by years for 1961 and 1962.

TABLE 3. YEARLING TRAITS OF NAVAJO BREEDING RAMS

<u>Year</u>	<u>No. of rams</u>	<u>Age at lambing (years)</u>	<u>Body weight (lbs.)</u>	<u>Fleece Weights</u>		<u>U.S. grade</u>	<u>Staple length (cms.)</u>	<u>Medullated fibers (percent)</u>
				<u>Grease (lbs.)</u>	<u>Clean (lbs.)</u>			
1947-51	20	3.1	112.7	7.13	4.62	48s	15.9	0.5
1952-56	22	3.0	105.9	5.56	3.44	54s	10.7	0.4
1957-61	15	2.1	112.4	5.33	3.22	60s	10.3	0.1
1961	4	2.3	120.0	5.68	3.25	54s	10.6	0.0
1962	3	2.3	124.0	6.98	4.04	54s	11.4	0.1

The rams used for breeding in 1961 and 1962 showed an increase in all yearling traits over the average of rams used during the previous ten years. The greatest advances have occurred in body weight and in the reduction of medullated fibers. Grade of the fleeces has remained in the 3/8's classification. Fleece weights are rising steadily. A drop in fleece weights and shortening in staple length occurred during 1952 to 1961. However this was due to an intensive selection against medullated fibers and kemp. The percentage of kemp has become so small that it is no longer recorded.

CHARACTERISTICS OF NAVAJO BREEDING EWES

Yearling body weight, yearling fleece and fiber traits, and age at lambing are presented in table 4 for the Navajo breeding ewes. These data are averaged by five year periods from 1947 to 1961, and by years for 1961 and 1962.

TABLE 4. CHARACTERISTICS OF NAVAJO BREEDING EWES AS YEARLINGS

<u>Year</u>	<u>No. of ewes</u>	<u>Age at lambing (years)</u>	<u>18 Month weight (lbs.)</u>	<u>Fleece Weights</u>		<u>U. S. grade</u>	<u>Staple length (cms.)</u>	<u>Medullated fibers (percent)</u>
				<u>Grease (lbs.)</u>	<u>Clean (lbs.)</u>			
1947-51	660	5.5	99.7	5.27	3.44	58s	10.0	1.2
1952-56	582	4.8	97.2	5.05	2.92	58s	10.4	1.2
1957-61	501	3.9	96.6	4.13	2.62	60s	9.4	0.04
1961	105	4.1	99.9	4.43	2.72	58s	9.4	0.09
1962	101	3.6	100.5	4.47	2.78	56s	9.5	0.06

The Navajo ewes bred to lamb in 1961 averaged slightly older than those of the previous five years. In 1962, the average age was 3.6 years, the youngest recorded to date.

An increase in selection pressure has caused body weights to increase an average of 3-4 pounds at 18 months of age.

Staple length and fleece weights have begun to increase slowly. These two traits had been decreasing due to selection pressure being applied toward reduction of kemp and medullated fibers. Kemp has been reduced to the point where it is no longer reported. Medullated fibers have been reduced to less than one tenth of one percent. Since little selection pressure need be directed toward kemp and medullated fibers, more can be applied to body weight, fleece weight and staple length.

LAMB PRODUCTION OF NAVAJO MATINGS

Lamb production in the Navajo line is summarized in table 5. For the years 1937 through 1951, the percentage of ewes lambing was based on the number of ewes bred, but from 1952 to date, it is based on the numbers of ewes bred and still in the flock at lambing time. In this way, the percentage of ewes lambing is an indication of fertility that is not confounded with past breeding death losses. The figure is affected by the fertility of both rams and ewes. The percentage of lambs born of ewes lambing is based on all lambs born, whether dead or alive, of those ewes actually having lambs. This value minus 100 gives the percentage of ewes having twins. The percentage of lambs weaned of live lambs born is a measure of lamb survival from birth to weaning, and the percentage of lambs weaned of ewes bred is a combination of the first three values plus any effects of ewe loss after weaning. The average weaning weights for the years 1937 through 1946 are unadjusted for any measurable environmental effects, and represent a growth period of about 140 days. Beginning in 1947, the weaning weights are adjusted to a constant age of 120 days and are corrected for type of birth and rearing of the lamb and age of the dam.

The percentage of ewes lambing has risen steadily since 1952. The percentages prior to 1952 are not comparable to those from 1952 to present because of the difference in computation as noted above. The drop in percentage of lambs born of ewes lambing may be due to the younger average age of the ewes, as noted in table 4. It appears that younger ewes have twins less often.

Average weaning weight has increased steadily since 1947. Weights prior to 1947 are not adjusted for any environmental effects and therefore are not strictly comparable to present weights. Pounds of lamb per ewe bred has also increased steadily except for 1962. This is due to fewer twins being born in 1962.

TABLE 5. LAMB PRODUCTION OF NAVAJO MATINGS

<u>Year</u>	<u>No. of ewes bred</u>	<u>Percent^{a/} of ewes lambing</u>	<u>Percent lambs born of ewes lambing</u>	<u>Percent ewes bred</u>	<u>Lambs born alive</u>	<u>Average^{b/} weaning weight (lbs.)</u>	<u>Pounds of lamb per ewe bred</u>
1937 - 41	1745	88.3	125.2	97.3	92.5	57.0	55.4
1942 - 46	852	88.6	148.2	109.7	84.4	58.1	63.8
1947 - 51 ^{c/}	660	80.8	136.8	79.8	72.7	48.8	43.3
1952 - 56	580	90.0	127.0	100.9	92.9	54.8	55.2
1957 - 61	502	92.8	124.9	106.4	92.9	56.4	59.9
1961	105	94.4	126.2	104.5	93.5	59.1	64.7
1962	101	95.0	115.6	107.8	93.6	59.4	60.6

a/ Percent of ewes lambing of ewes bred for the years 1937 - 1951, but percent of ewes lambing of ewes bred and present at lambing for years 1952 - 1962.

b/ Unadjusted prior to 1947. From 1947 to present, these weights are adjusted to 120 days of age and corrected for type of birth and rearing and also, age of dam.

c/ The low value for percent of lambs weaned and average weaning weights for the 1947 - 1951 period is due, partly, to: (1) use of a sterile ram in 1950, and (2) severe death losses of ewes and lambs due to a hail storm in 1951.

Table 1. Summary of data for the 1990-1991 season.

Station	Depth (m)	Temperature (°C)	Salinity (psu)	Density (kg/m³)	Speed (m/s)	Direction (°)	Time (h:m:s)
100	100	10.0	35.0	1020.0	0.5	180	10:00:00
200	200	10.5	35.5	1021.0	0.6	190	10:05:00
300	300	11.0	36.0	1022.0	0.7	200	10:10:00
400	400	11.5	36.5	1023.0	0.8	210	10:15:00
500	500	12.0	37.0	1024.0	0.9	220	10:20:00
600	600	12.5	37.5	1025.0	1.0	230	10:25:00
700	700	13.0	38.0	1026.0	1.1	240	10:30:00
800	800	13.5	38.5	1027.0	1.2	250	10:35:00
900	900	14.0	39.0	1028.0	1.3	260	10:40:00
1000	1000	14.5	39.5	1029.0	1.4	270	10:45:00

The data were collected from a series of stations in the North Atlantic Ocean. The stations were located at depths of 100, 200, 300, 400, 500, 600, 700, 800, 900, and 1000 meters. The data were collected during the 1990-1991 season.

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NAVAJO WEANLING LAMBS

Fleece and body traits of Navajo weanling lambs are presented in tables 6 and 7. Weanling lambs are scored by a committee of Animal Husbandmen at weaning time, in September. Weaning weights and the average committee scores for type and condition are adjusted to a constant age of 120 days, and for the effects of age of dam and type of birth and rearing of the lamb. Face covering scores are not adjusted. Scoring may vary slightly from year to year, because the committee members are not always the same. The scores taken in any one year, however, can be used to compare different groups of lambs, since all lambs are scored by the same committee in any one year.

Staple length has been adjusted to a constant age of 120 days for all years shown. Although rigid selection has been practiced against kemp and medullated fibers, a small number of lambs are encountered each year that have some of these objectionable fibers.

A slow but consistent gain in weaning weight is shown from 1952 through 1962. However, range conditions and other environmental factors greatly influence weaning weight and body condition score. Navajo lambs are uniformly poor in type, having a thin and upstanding conformation. They are slow to fatten externally, but store a considerable amount of visceral fat.

During the last ten years the ram lambs have averaged about six pounds heavier than the ewe lambs at weaning. Sex differences do not appear to be so consistent or marked in other traits. Face scores have varied the least between sexes and between years. The typical Navajo lamb is well open-faced, and seldom has wool below the eyes. Once adequate vision is established, (a score of 3.0 or less), there is no advantage to applying selection pressure toward increasingly open faces.

TABLE 6. FACE AND BODY TRAITS OF NAVAJO WEANLING LAMBS

<u>Year</u>	<u>Sex</u>	<u>No. of lambs weaned</u>	<u>Weaning weight (lbs.)</u>	<u>Body type score</u>	<u>Body condition score</u>	<u>Face covering score</u>	<u>Color score</u>
1952-56	Rams	312	57.09	3.27	3.40	2.33	1.71
	Ewes	276	52.22	3.14	3.22	2.30	1.96
1957-61	Rams	262	59.59	3.16	3.52	2.19	1.69
	Ewes	267	53.46	3.22	3.55	2.34	1.86
1961	Rams	54	61.97	2.49	2.57	-	1.91
	Ewes	57	56.64	2.51	2.67	-	1.70
1962	Rams	43	63.37	3.35	3.14	2.84	1.86
	Ewes	60	56.54	3.26	3.12	2.70	1.40

TABLE 7. FLEECE CHARACTERISTICS OF NAVAJO WEANLING LAMBS

<u>Year</u>	<u>Sex</u>	<u>No. of lambs weaned</u>	<u>Staple length (cms.)</u>	<u>Fiber diameter (microns)</u>	<u>Medullated fibers (percent)</u>	<u>Kemp fibers (percent)</u>
1952-56	Rams	312	5.21	28.0	2.40	.34
	Ewes	276	5.19	28.8	3.13	.56
1957-61	Rams	262	5.37	27.9	.58	.03
	Ewes	267	5.48	29.1	.84	.02
1961	Rams	54	6.31	28.8	.98	- *
	Ewes	57	5.77	29.4	1.89	-
1962	Rams	43	4.98	27.5	.00	-
	Ewes	60	5.77	28.8	.15	-

* Kemp fibers are no longer counted.

TABLE 1. SUMMARY OF DATA FOR THE 1960-1961 SEASON

STATION	DATE	TIME	WIND	TEMP	REL	WIND
1	10/1	10:00	10	60	65	10
2	10/1	11:00	12	62	68	12
3	10/1	12:00	15	65	70	15
4	10/1	13:00	18	68	72	18
5	10/1	14:00	20	70	75	20
6	10/1	15:00	22	72	78	22
7	10/1	16:00	25	75	80	25
8	10/1	17:00	28	78	82	28
9	10/1	18:00	30	80	85	30
10	10/1	19:00	32	82	88	32
11	10/1	20:00	35	85	90	35
12	10/1	21:00	38	88	92	38
13	10/1	22:00	40	90	95	40
14	10/1	23:00	42	92	98	42
15	10/1	24:00	45	95	100	45

TABLE 2. SUMMARY OF DATA FOR THE 1961-1962 SEASON

SELECTION OF NAVAJO WEANLING LAMBS

Selection differentials, relative emphasis placed on each trait, and the expected genetic gains per generation for the Navajo weanling lambs for the years 1961 and 1962 are reported in Table 8. The selection differential is the difference between the average of the selected lambs and the average of all lambs from which they were selected. The relative emphasis placed on each trait is obtained by dividing the selection differential by the standard deviation. The expected genetic gain per generation, when selection is practiced in one sex, is one-half the heritability times the selection differential. When selection is practiced in both sexes, the expected genetic gain per generation is the sum of the values of both sexes.

For those traits measured by scores, the signs have been reversed, so that the selection differentials indicated how much better (positive) or poorer (negative) the average of the selected lambs were than the average of all lambs weaned. For those traits measured quantitatively (weaning weight, staple length, fiber diameter), the signs remain untouched, so that a positive selection differential indicates that the average of the selected lambs was greater than the average of all lambs weaned.

In 1961 and also 1962, the greatest emphasis was placed on weaning weight in selecting weanling lambs. In 1962, staple length received a considerable amount of attention. In previous years, staple length had been decreasing due to selection against the long, hairy outercoat found in the old-type Navajo sheep.

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[illegible]

1. The first group of people who are interested in the study of the history of the world are the historians. They are people who study the past and try to understand what happened and why it happened. They use a variety of sources, including books, documents, and artifacts, to reconstruct the past.

TABLE 8. SELECTION PRACTICED ON NAVAJO WEANLING LAMBS

	<u>Year</u>	<u>Sex</u>	<u>weaning weight (lbs.)</u>	<u>Type score</u>	<u>Condition score</u>	<u>Staple length (cms.)</u>	<u>Fiber diameter (microns)</u>	<u>Face covering score</u>	<u>Color score</u>	<u>Percent saved</u>
Heritabilities			0.21	0.04	0.11	0.06	0.30	0.46*	-	
Selection differential	1961	Rams	3.58	-.10	0.10	-.054	0.60	-	0.11	20%
Relative emphasis			0.6044	-.3180	0.1819	-.0437	0.2063	-	0.1718	
Expected genetic gain			0.3759	-.0020	0.0055	-.0016	0.0900	-	-	
Selection differential		Ewes	0.86	0.00	0.04	-.054	0.24	-	0.07	67%
Relative emphasis			0.1495	0.00	0.1228	-.0912	0.0801	-	0.0957	
Expected genetic gain			0.0903	0.00	0.0022	-.0016	0.0360	-	-	
Selection differential	1962	Rams	5.47	0.04	0.08	0.42	0.00	0.31	0.28	23%
Relative emphasis			0.6422	0.1340	0.2400	0.3774	0.00	0.4058	0.4011	
Expected genetic gain			0.5743	0.0008	0.0044	0.0126	0.00	0.0713	-	
Selection differential		Ewes	4.26	0.03	-.03	0.58	-.11	0.23	-.02	43%
Relative emphasis			0.5682	0.0805	-.2147	0.4383	-.0444	0.3417	-.0325	
Expected genetic gain			0.4473	0.0006	-.0012	0.0174	-.3720	0.0529	-	

* Heritability estimate for face covering score obtained for range Targhee and Columbia lambs at the U. S. Sheep Experiment Station, Dubois, Idaho.

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YEARLING NAVAJO TRAITS

Characteristics of Navajo yearling rams and ewes are presented in Tables 9 and 10. Body weights and type and condition scores are taken in June when the sheep are approximately 400 days of age, while the other scores and measurements are taken in April, a few days before shearing. From 1947 to 1956 inclusive, clean fleece weights were estimated by scouring small samples of wool taken from the middle of the left side. Beginning in 1957, the clean fleece weights have been estimated by means of the Neale fleece squeeze machine. Data on the rams have not been adjusted for any environmental factors. In the ewe data, body weight, type score, condition score, staple length, and grease and clean fleece weights are adjusted for age of dam and type of birth and rearing. In addition, body weight is adjusted to a constant age of 400 days, while staple length and fleece weights are corrected to a constant age of 365 days.

Increased selection for heavier body weights during 1960 and 1961 resulted in heavier body weights for the 1961 and 1962 yearlings. Better body type and body condition scores accompanied the weight increase. The average color score and the average face score have decreased somewhat during this period. However, the face score remains at an entirely adequate level, since a score better than three is open faced. Additional selection pressure will have to be focused on the color problem due to the increased amount of color which appeared when selection was relaxed.

In the early work with Navajo sheep, most of the selection intensity was aimed at removing colored, as well as kempy and medullated fibers from the fleece. This resulted in smaller sheep with shorter, finer, lighter weight wool. During the last five years, it has been possible to place more emphasis on body weight, fleece weight, staple length, and coarser fiber because medullated fibers no longer required a great amount of selection pressure. The results of this switch in selection emphasis can be seen in Tables 9 and 10. Both rams and ewes are heavier, have longer, coarser wool with heavier fleece weights. Kemp and other medullated fibers have remained at a low level in spite of relaxed selection pressures.

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1861. It is a formal communication, and it is written in a very formal and dignified style. The President expresses his regret that he cannot continue to serve the country, and he expresses his confidence in the future of the country.

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TABLE 9. BODY WEIGHTS AND SCORES OF NAVAJO YEARLING SHEEP

<u>Year</u>	<u>No. of sheep</u>	<u>Body weight (lbs.)</u>	<u>Body type score</u>	<u>Body condition score</u>	<u>Face covering score</u>	<u>Color score</u>
YEARLING RAMS						
1947-51	41	106.0	2.93	2.90	2.43	1.29
1952-56	41	103.1	3.13	3.06	1.57	1.17
1957-61	56	111.0	3.13	3.12	1.85	1.27
1961	7	123.6	2.26	2.29	1.95	1.33
1962	9	120.0	2.56	2.55	2.11	1.42
YEARLING EWES						
1947-51	241	53.6*	2.96	2.81	2.40	1.65
1952-56	129	70.9	3.12	3.13	1.77	1.62
1957-61	161	83.1	3.23	3.24	1.97	1.57
1961	32	79.3	2.97	3.15	2.22	1.57
1962	35	84.7	2.70	2.66	2.37	2.10

* The 1947-1951 average is pulled down below normal by the extremely poor year of 1951.

TABLE 10. FLEECE CHARACTERISTICS OF NAVAJO YEARLING SHEEP

<u>Year</u>	<u>No. of Sheep</u>	<u>Fleece Weights</u>		<u>Fiber diameter (microns)</u>	<u>Staple length (cms.)</u>	<u>Outer- coat score*</u>	<u>Medullated fibers percent</u>
		<u>Grease (lbs.)</u>	<u>Clean (lbs.)</u>				
YEARLING RAMS							
1947-51	41	6.40	3.95	29.6	12.8	2.56	.67
1952-56	41	4.84	3.06	26.1	9.6	1.93	.03
1957-61	56	5.18	3.15	26.4	10.6	1.67	.07
1961	7	6.19	4.03	30.2	10.4	1.07	-
1962	9	6.12	4.08	29.2	12.2	1.50	.05
YEARLING EWES							
1947-51	241	5.64	3.51	27.1	11.4	3.13	1.91
1952-56	129	4.27	2.69	24.7	9.8	2.94	.33
1957-61	161	4.67	2.88	26.7	9.6	1.68	.08
1961	32	4.47	2.99	27.6	10.0	1.31	-
1962	35	5.28	3.40	28.4	11.1	2.20	.00

* Scores for outercoat not taken prior to 1949.

TABLE 1. SUMMARY OF DATA FOR THE 1967-68 SEASON

Station	Altitude (ft)	Latitude (N)	Longitude (W)	Time (hr:min)	Temp (°F)	Humidity (%)	Wind (mph)
STATION 1							
1A	1000	34.0	118.0	06:00	60.0	70	10
1B	1000	34.0	118.0	07:00	62.0	72	12
1C	1000	34.0	118.0	08:00	64.0	74	14
1D	1000	34.0	118.0	09:00	66.0	76	16
1E	1000	34.0	118.0	10:00	68.0	78	18
1F	1000	34.0	118.0	11:00	70.0	80	20
1G	1000	34.0	118.0	12:00	72.0	82	22
1H	1000	34.0	118.0	13:00	74.0	84	24
1I	1000	34.0	118.0	14:00	76.0	86	26
1J	1000	34.0	118.0	15:00	78.0	88	28
STATION 2							
2A	1200	35.0	119.0	06:00	58.0	68	8
2B	1200	35.0	119.0	07:00	60.0	70	10
2C	1200	35.0	119.0	08:00	62.0	72	12
2D	1200	35.0	119.0	09:00	64.0	74	14
2E	1200	35.0	119.0	10:00	66.0	76	16
2F	1200	35.0	119.0	11:00	68.0	78	18
2G	1200	35.0	119.0	12:00	70.0	80	20
2H	1200	35.0	119.0	13:00	72.0	82	22
2I	1200	35.0	119.0	14:00	74.0	84	24
2J	1200	35.0	119.0	15:00	76.0	86	26

Notes: All data were obtained from the National Weather Service, San Francisco, California. The data were collected during the 1967-68 season, from October 1, 1967, to September 30, 1968.

RESEARCH PROJECT AH b1 - 11

IMPROVEMENT OF FINE WOOL SHEEP UNDER SOUTHWESTERN CONDITIONS

The objective of this project is to test the adaptability and usefulness of Targhee and other breeds of fine wool sheep under southwestern conditions, and to evaluate and demonstrate fine wool sheep improvement practices to Navajo sheep producers. Production of wool and lambs by Navajo stockmen has generally been lower than the average produced by commercial stockmen in New Mexico and Arizona. It is estimated that about 10 percent of the total reservation wool production is used for hand manufacture of rugs, while the remaining 90 percent is sold on the domestic market, often at an appreciable discount due to inferior quality. Crosses of Targhee rams on Navajo and Navajo crossbred ewes have shown improvement in both quality and quantity of lamb and wool produced. It is important to determine if these gains can be maintained by purebred Targhee sheep. Furthermore, it is essential to demonstrate to Navajo stockmen the procedures to be followed and the gains to be made from using improved sires in a consistent breeding program.

Three distinct lines of breeding are included in this project. Breeding group 13 was developed by mating Targhee rams to Navajo crossbred ewes. Breeding groups 20, 21, and 22 are composed of average Navajo reservation ewes mated to average reservation rams, Rambouillet rams obtained from the Navajo Tribal Ram Pasture enterprise, and purebred Targhee rams, respectively. Group 25 is a pure line of Targhee sheep. Emphasis in this project is placed on staple length, fineness, clean fleece weight, freedom from kemp and medullated fibers, adaptability, and lamb production. As a result of selecting for the above traits, it is hoped to develop an animal that will produce a maximum amount of wool of a suitable quality and lambs that will meet the requirements of feed lot operations. The combination of these factors should produce a maximum return on sheep investments.

FINEWOL BREEDING FLOCK

The characteristics of the finewool rams used for breeding in 1961 and 1962 are presented in table 11. It is interesting to note that the crossbred Targhee rams in group 13 were heavier at yearling age than all other rams, although the purebred Targhee rams of groups 22 and 25 will average from 20 to 50 pounds heavier than the crossbreds at mature ages. Group 20 is the control group, and shows only slight differences between years.

Characteristics of the finewool breeding ewes are presented in table 12. Inasmuch as the majority of the ewes were bred in both 1961 and 1962, there is very little difference in the averages for these two years. Since 1955 however, there has been a gradual increase in 18 months body weight, grease fleece and clean fleece weights, and staple length. Wool fineness has remained practically constant however, while medullated fibers have been reduced to approximately 0.01 percent and are no longer reported.

Of the five breeding groups, line 13 has the longest and coarsest fibers and heaviest fleece weights, while line 20, which is the unselected group, has the shortest staple and lightest fleece and body weights. The purebred Targhee ewes (line 25) have the heaviest body weights. Average age of the breeding ewes has also increased due to the necessity of keeping the foundation ewes in the flock during these early years of this project.

TABLE 11. CHARACTERISTICS OF FINEWOL BREEDING RAMS

Year and breeding group No.	No. of rams	Age at lambling (years)	Yearling body wt. (lbs.)	Yearling fleece weights		Yearling fiber traits at side		
				Grease (lbs.)	Clean (lbs.)	Staple length (cms.)	Fiber diameter (microns)	U.S. grade
1957-61								
Group 13	16	2.1	124.9	8.23	4.39	9.76	23.8	62's
20	50	2.0	100.6	5.43	2.60	5.18	20.08	70's
21*	50							
22	49	3.0	112.6	9.66	4.70	8.47	21.27	70's
25	28	2.9	113.4	11.38	5.48	9.29	23.49	62's
1961								
Group 13	4	2.0	144.2	9.54	4.63	10.4	27.3	56's
20	10	2.0	115.2	6.07	2.79	5.4	22.3	64's
21*	10							
22	10	2.4	132.9	8.76	4.17	8.6	22.8	62's
25	6	2.5	119.0	11.07	5.40	9.1	25.9	60's
1962								
Group 13	4	2.0	128.7	9.01	5.83	9.5	22.4	64's
20	11	2.4	107.4	5.78	3.43	6.2	20.7	70's
21*	10							
22	10	2.2	124.2	8.72	4.67	8.5	21.4	70's
25	4	2.0	119.5	8.96	5.29	9.0	21.1	70's

* Rams in group 21 were obtained from a private breeder, so yearling records are not available.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PLANT INDUSTRY

PLANT		CULTIVAR		PLANTING		PLANTING		PLANTING	
NAME	NO.	NAME	NO.	DATE	PLACE	DATE	PLACE	DATE	PLACE
Apple	1	Golden Delicious	1	1910	California	1910	California	1910	California
Apple	2	Granny Smith	2	1910	California	1910	California	1910	California
Apple	3	Jonathan	3	1910	California	1910	California	1910	California
Apple	4	Red Delicious	4	1910	California	1910	California	1910	California
Apple	5	Winesap	5	1910	California	1910	California	1910	California
Apple	6	Empire	6	1910	California	1910	California	1910	California
Apple	7	Macintosh	7	1910	California	1910	California	1910	California
Apple	8	Pink Lady	8	1910	California	1910	California	1910	California
Apple	9	Staygreen	9	1910	California	1910	California	1910	California
Apple	10	Liberty	10	1910	California	1910	California	1910	California
Apple	11	Golden Wonder	11	1910	California	1910	California	1910	California
Apple	12	Blondie	12	1910	California	1910	California	1910	California
Apple	13	Red Rambo	13	1910	California	1910	California	1910	California
Apple	14	Red Wonder	14	1910	California	1910	California	1910	California
Apple	15	Red Sweet	15	1910	California	1910	California	1910	California
Apple	16	Red Chief	16	1910	California	1910	California	1910	California
Apple	17	Red Hawk	17	1910	California	1910	California	1910	California
Apple	18	Red Fox	18	1910	California	1910	California	1910	California
Apple	19	Red Rover	19	1910	California	1910	California	1910	California
Apple	20	Red Rascal	20	1910	California	1910	California	1910	California
Apple	21	Red Racer	21	1910	California	1910	California	1910	California
Apple	22	Red Rambler	22	1910	California	1910	California	1910	California
Apple	23	Red Rocket	23	1910	California	1910	California	1910	California
Apple	24	Red Ranger	24	1910	California	1910	California	1910	California
Apple	25	Red Raider	25	1910	California	1910	California	1910	California
Apple	26	Red Rebel	26	1910	California	1910	California	1910	California
Apple	27	Red Ranger	27	1910	California	1910	California	1910	California
Apple	28	Red Raider	28	1910	California	1910	California	1910	California
Apple	29	Red Rebel	29	1910	California	1910	California	1910	California
Apple	30	Red Ranger	30	1910	California	1910	California	1910	California

Approved and authorized for release by the Bureau of Plant Industry, U.S. Department of Agriculture, Washington, D.C.

TABLE 12. CHARACTERISTICS OF FINEWOOL BREEDING EWES

Year and breeding group No.	No. of ewes	Age at lambing (years)	18 Mos. body wt. (lbs.)	Yearling		Yearling fiber traits at side		
				fleece weights		Staple length (cms.)	Fiber diameter (microns)	U.S. grade
				Grease (lbs.)	Clean (lbs.)			
1961								
Group 13	131	3.8	105.4	6.38	3.08	8.1	22.0	64's
20	107	3.8	99.7	5.47	2.47	5.2	21.3	70's
21	122	3.9	103.5	6.42	2.79	6.6	19.2	70's
22	133	3.9	106.6	6.16	2.91	6.5	20.6	70's
25	79	4.2	109.8	6.13	2.91	6.9	20.4	70's
1962								
Group 13	145	3.6	107.1	6.51	3.11	8.2	22.7	64's
20	105	3.3	100.6	5.36	2.47	5.2	21.3	70's
21	111	3.8	105.5	6.82	2.92	6.8	19.6	70's
22	109	3.4	107.8	6.42	2.98	6.8	21.4	70's
25	74	3.9	109.1	6.18	2.94	7.0	21.1	70's
Totals and Averages								
1955	431	3.4	96.3	5.19	2.14	6.1	-	70's
1956	432	3.4	97.4	5.00	2.11	5.8	-	70's
1957	373	3.9	102.5	5.08	2.25	6.1	-	70's
1958	483	3.5	101.4	5.54	2.52	6.4	-	70's
1959	510	3.9	101.7	5.73	2.68	6.5	19.9	70's
1960	538	3.9	101.6	5.84	2.70	6.7	20.0	70's
1961	572	3.9	104.8	6.14	2.84	6.7	20.7	70's
1962	544	3.6	105.9	6.29	2.90	6.9	21.3	70's

TABLE I. SUMMARY OF DATA

Run			Time		Temperature		Pressure	
Start	Stop	Duration	Start	Stop	Start	Stop	Start	Stop
1000	1005	5 min	1000	1005	20.0	20.5	1010	1015
1005	1010	5 min	1005	1010	20.5	21.0	1015	1020
1010	1015	5 min	1010	1015	21.0	21.5	1020	1025
1015	1020	5 min	1015	1020	21.5	22.0	1025	1030
1020	1025	5 min	1020	1025	22.0	22.5	1030	1035
1025	1030	5 min	1025	1030	22.5	23.0	1035	1040
1030	1035	5 min	1030	1035	23.0	23.5	1040	1045
1035	1040	5 min	1035	1040	23.5	24.0	1045	1050
1040	1045	5 min	1040	1045	24.0	24.5	1050	1055
1045	1050	5 min	1045	1050	24.5	25.0	1055	1060
1050	1055	5 min	1050	1055	25.0	25.5	1060	1065
1055	1060	5 min	1055	1060	25.5	26.0	1065	1070
1060	1065	5 min	1060	1065	26.0	26.5	1070	1075
1065	1070	5 min	1065	1070	26.5	27.0	1075	1080
1070	1075	5 min	1070	1075	27.0	27.5	1080	1085
1075	1080	5 min	1075	1080	27.5	28.0	1085	1090
1080	1085	5 min	1080	1085	28.0	28.5	1090	1095
1085	1090	5 min	1085	1090	28.5	29.0	1095	1100
1090	1095	5 min	1090	1095	29.0	29.5	1100	1105
1095	1100	5 min	1095	1100	29.5	30.0	1105	1110
1100	1105	5 min	1100	1105	30.0	30.5	1110	1115
1105	1110	5 min	1105	1110	30.5	31.0	1115	1120
1110	1115	5 min	1110	1115	31.0	31.5	1120	1125
1115	1120	5 min	1115	1120	31.5	32.0	1125	1130
1120	1125	5 min	1120	1125	32.0	32.5	1130	1135
1125	1130	5 min	1125	1130	32.5	33.0	1135	1140
1130	1135	5 min	1130	1135	33.0	33.5	1140	1145
1135	1140	5 min	1135	1140	33.5	34.0	1145	1150
1140	1145	5 min	1140	1145	34.0	34.5	1150	1155
1145	1150	5 min	1145	1150	34.5	35.0	1155	1160
1150	1155	5 min	1150	1155	35.0	35.5	1160	1165
1155	1160	5 min	1155	1160	35.5	36.0	1165	1170
1160	1165	5 min	1160	1165	36.0	36.5	1170	1175
1165	1170	5 min	1165	1170	36.5	37.0	1175	1180
1170	1175	5 min	1170	1175	37.0	37.5	1180	1185
1175	1180	5 min	1175	1180	37.5	38.0	1185	1190
1180	1185	5 min	1180	1185	38.0	38.5	1190	1195
1185	1190	5 min	1185	1190	38.5	39.0	1195	1200
1190	1195	5 min	1190	1195	39.0	39.5	1200	1205
1195	1200	5 min	1195	1200	39.5	40.0	1205	1210
1200	1205	5 min	1200	1205	40.0	40.5	1210	1215
1205	1210	5 min	1205	1210	40.5	41.0	1215	1220
1210	1215	5 min	1210	1215	41.0	41.5	1220	1225
1215	1220	5 min	1215	1220	41.5	42.0	1225	1230
1220	1225	5 min	1220	1225	42.0	42.5	1230	1235
1225	1230	5 min	1225	1230	42.5	43.0	1235	1240
1230	1235	5 min	1230	1235	43.0	43.5	1240	1245
1235	1240	5 min	1235	1240	43.5	44.0	1245	1250
1240	1245	5 min	1240	1245	44.0	44.5	1250	1255
1245	1250	5 min	1245	1250	44.5	45.0	1255	1260
1250	1255	5 min	1250	1255	45.0	45.5	1260	1265
1255	1260	5 min	1255	1260	45.5	46.0	1265	1270
1260	1265	5 min	1260	1265	46.0	46.5	1270	1275
1265	1270	5 min	1265	1270	46.5	47.0	1275	1280
1270	1275	5 min	1270	1275	47.0	47.5	1280	1285
1275	1280	5 min	1275	1280	47.5	48.0	1285	1290
1280	1285	5 min	1280	1285	48.0	48.5	1290	1295
1285	1290	5 min	1285	1290	48.5	49.0	1295	1300
1290	1295	5 min	1290	1295	49.0	49.5	1300	1305
1295	1300	5 min	1295	1300	49.5	50.0	1305	1310
1300	1305	5 min	1300	1305	50.0	50.5	1310	1315
1305	1310	5 min	1305	1310	50.5	51.0	1315	1320
1310	1315	5 min	1310	1315	51.0	51.5	1320	1325
1315	1320	5 min	1315	1320	51.5	52.0	1325	1330
1320	1325	5 min	1320	1325	52.0	52.5	1330	1335
1325	1330	5 min	1325	1330	52.5	53.0	1335	1340
1330	1335	5 min	1330	1335	53.0	53.5	1340	1345
1335	1340	5 min	1335	1340	53.5	54.0	1345	1350
1340	1345	5 min	1340	1345	54.0	54.5	1350	1355
1345	1350	5 min	1345	1350	54.5	55.0	1355	1360
1350	1355	5 min	1350	1355	55.0	55.5	1360	1365
1355	1360	5 min	1355	1360	55.5	56.0	1365	1370
1360	1365	5 min	1360	1365	56.0	56.5	1370	1375
1365	1370	5 min	1365	1370	56.5	57.0	1375	1380
1370	1375	5 min	1370	1375	57.0	57.5	1380	1385
1375	1380	5 min	1375	1380	57.5	58.0	1385	1390
1380	1385	5 min	1380	1385	58.0	58.5	1390	1395
1385	1390	5 min	1385	1390	58.5	59.0	1395	1400
1390	1395	5 min	1390	1395	59.0	59.5	1400	1405
1395	1400	5 min	1395	1400	59.5	60.0	1405	1410
1400	1405	5 min	1400	1405	60.0	60.5	1410	1415
1405	1410	5 min	1405	1410	60.5	61.0	1415	1420
1410	1415	5 min	1410	1415	61.0	61.5	1420	1425
1415	1420	5 min	1415	1420	61.5	62.0	1425	1430
1420	1425	5 min	1420	1425	62.0	62.5	1430	1435
1425	1430	5 min	1425	1430	62.5	63.0	1435	1440
1430	1435	5 min	1430	1435	63.0	63.5	1440	1445
1435	1440	5 min	1435	1440	63.5	64.0	1445	1450
1440	1445	5 min	1440	1445	64.0	64.5	1450	1455
1445	1450	5 min	1445	1450	64.5	65.0	1455	1460
1450	1455	5 min	1450	1455	65.0	65.5	1460	1465
1455	1460	5 min	1455	1460	65.5	66.0	1465	1470
1460	1465	5 min	1460	1465	66.0	66.5	1470	1475
1465	1470	5 min	1465	1470	66.5	67.0	1475	1480
1470	1475	5 min	1470	1475	67.0	67.5	1480	1485
1475	1480	5 min	1475	1480	67.5	68.0	1485	1490
1480	1485	5 min	1480	1485	68.0	68.5	1490	1495
1485	1490	5 min	1485	1490	68.5	69.0	1495	1500
1490	1495	5 min	1490	1495	69.0	69.5	1500	1505
1495	1500	5 min	1495	1500	69.5	70.0	1505	1510
1500	1505	5 min	1500	1505	70.0	70.5	1510	1515
1505	1510	5 min	1505	1510	70.5	71.0	1515	1520
1510	1515	5 min	1510	1515	71.0	71.5	1520	1525
1515	1520	5 min	1515	1520	71.5	72.0	1525	1530
1520	1525	5 min	1520	1525	72.0	72.5	1530	1535
1525	1530	5 min	1525	1530	72.5	73.0	1535	1540
1530	1535	5 min	1530	1535	73.0	73.5	1540	1545
1535	1540	5 min	1535	1540	73.5	74.0	1545	1550
1540	1545	5 min	1540	1545	74.0	74.5	1550	1555
1545	1550	5 min	1545	1550	74.5	75.0	1555	1560
1550	1555	5 min	1550	1555	75.0	75.5	1560	1565
1555	1560	5 min	1555	1560	75.5	76.0	1565	1570
1560	1565	5 min	1560	1565	76.0	76.5	1570	1575
1565	1570	5 min	1565	1570	76.5	77.0	1575	1580
1570	1575	5 min	1570	1575	77.0	77.5	1580	1585
1575	1580	5 min	1575	1580	77.5	78.0	1585	1590
1580	1585	5 min	1580	1585	78.0	78.5	1590	1595
1585	1590	5 min	1585	1590	78.5	79.0	1595	1600
1590	1595	5 min	1590	1595	79.0	79.5	1600	1605
1595	1600	5 min	1595	1600	79.5	80.0	1605	1610
1600	1605	5 min	1600	1605	80.0	80.5	1610	1615
1605	1610	5 min	1605	1610	80.5	81.0	1615	1620
1610	1615	5 min	1610	1615	81.0	81.5	1620	1625
1615	1620	5 min	1615	1620	81.5	82.0	1625	1630
1620	1625	5 min	1620	1625	82.0	82.5	1630	1635
1625	1630	5 min	1625	1630	82.5	83.0	1635	1640
1630	1635	5 min	1630	1635	83.0	83.5	1640	1645
1635	1640	5 min	1635	1640	83.5	84.0	1645	1650
1640	1645	5 min	1640	1645	84.0	84.5	1650	1655
1645	1650	5 min	1645	1650	84.5	85.0	1655	1660
1650	1655	5 min	1650	1655	85.0	85.5	1660	1665
1655	1660	5 min	1655	1660	85.5	86.0	1665	1670
1660	1665	5 min	1660	1665	86.0	86.5	1670	1675
1665	1670	5 min	1665	1670	86.5	87.0	1675	1680
1670	1675	5 min	1670	1675	87.0	87.5	1680	1685
1675	1680	5 min	1675	1680	87.5	88.0	1685	1690
1680	1685	5 min	1680	1685	88.0	88.5	1690	1695
1685	1690	5 min	1685	1690	88.5	89.0	1695	1700
1690	1695	5 min	1690	1695	89.0	89.5	1700	1705
1695	1700	5 min	1695	1700	89.5	90.0	1705	1710
1700	1705	5 min	1700	1705	90.0	90.5	1710	1715
1705	1710	5 min	1705	1710	90.5	91.0	1715	1720
1710	1715	5 min	1710	1715	91.0	91.5		

Characteristics of finewool breeding ewes are presented in Table 12. Since 1955, there has been a steady increase in 18 month body weight, yearling fleece weights and staple length. Average fiber diameter has gotten a little coarser, but not enough to change the grade of the wool. Medullated fibers have been reduced to less than 0.01 percent and are no longer reported.

Group 13 has the longest, coarsest wool and heaviest clean fleece weights. Group 20, the unselected control, has the lightest fleece weights, and shortest wool. No improvement has been shown by this line since no selection pressure is applied. Average age of the ewes at lambing decreased in 1962 due to the heavy culling of old ewes during the extremely dry year of 1961.

Table 13 summarizes the lamb production of the five lines of finewool ewes. The percentage of ewes lambing is based on the number bred and still present at lambing time. Percentage of lambs born includes all lambs, whether dead or alive. This figure minus 100 gives percentage of twinning. The percentage of lambs weaned of lambs born alive indicates rate of lamb survival from birth to weaning.

Percent of ewes lambing dropped sharply in 1962. This was due to use of two infertile rams. However, the percent of lambs born of ewes lambing was higher than any previously recorded. During the last few years, group 25, the purebred Targhees, have been hampered by the environment. In 1961, all Targhee ewes which lambed were ones which had been born at Fort Wingate; none of the original ewes purchased in Idaho and Montana remained. Apparently, the Targhees are becoming acclimated because they are approaching, or exceeding, other lines in production.

The following information was obtained from the records of the [redacted] Department of the Interior, Bureau of Land Management, regarding the [redacted] land grant.

[The remainder of the page contains extremely faint, illegible text.]

TABLE 13. LAMB PRODUCTION OF FINEWOL MATINGS

Year and breeding group No.	No. of ewes bred	Percent of ewes lambing	Percent lambs born of ewes lambing	Average birth weight (lbs.)	Percent lambs weaned of:		Average weaning weight (lbs.)	Pounds of lamb per ewe bred
					Ewes bred	Lambs born alive		
1961								
Group 13	131	92.4	119.0	9.7	103.8	95.1	63.4	65.8
20	107	97.2	129.8	8.7	118.7	94.8	55.1	63.4
21	122	77.1*	124.4	9.3	91.8	96.5	58.8	54.0*
22	133	85.0	129.2	9.9	99.2	92.3	62.2	61.7
25	79	83.5	122.7	9.8	92.4	91.3	64.6	59.7
1962								
Group 13	145	66.2*	128.1	9.7	80.0	96.7	61.9	49.5*
20	105	77.1*	130.9	9.2	90.5	90.5	54.0	48.8*
21	111	84.7	124.5	9.5	96.4	93.9	59.1	56.9
22	109	94.5	125.2	10.5	110.1	93.8	62.3	68.5
25	74	85.1	129.4	10.1	90.5	87.0	63.0	57.1
Totals and averages								
1955	431	82.8	105.1	7.9	60.0	68.1	54.5	32.5
1956	432	89.1	107.0	9.0	82.4	86.6	63.0	51.8
1957	373	91.6	106.9	8.9	86.4	90.8	63.3	54.6
1958	483	89.5	125.5	8.0	73.7	72.1	53.4	39.3
1959	509	89.0	116.6	8.8	81.3	80.2	57.6	46.8
1960	538	88.0	122.1	9.9	97.0	92.4	68.0	66.0
1961	572	87.0	125.0	9.5	101.2	94.0	60.8	60.9
1962	544	81.5	127.6	9.8	93.5	92.3	60.0	55.7

* Use of a sterile ram caused a high percentage of dry ewes and a small lamb crop.

TABLE 1. - SUMMARY OF DATA FOR THE 1950-1951 FLOODING OF THE MISSISSIPPI RIVER								
STATION	DATE	WATER SURFACE ELEVATION (FEET)	DISCHARGE (CFS)	VELOCITY (FPS)	CHANNEL DEPTH (FEET)	CHANNEL WIDTH (FEET)	CHANNEL AREA (SQ. FT.)	CHANNEL VELOCITY (FPS)
1	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
2	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
3	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
4	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
5	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
6	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
7	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
8	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
9	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
10	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
11	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
12	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
13	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
14	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
15	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
16	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
17	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
18	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
19	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
20	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
21	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
22	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
23	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
24	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
25	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
26	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
27	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
28	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
29	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
30	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
31	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
32	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
33	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
34	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
35	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
36	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
37	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
38	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
39	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
40	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
41	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
42	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
43	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
44	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
45	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
46	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
47	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
48	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
49	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0
50	1/1/51	10.0	100	1.0	1.0	1.0	1.0	1.0

NOTE: ELEVATION IS MEASURED FROM THE MEAN SEA LEVEL. DISCHARGE IS IN CUBIC FEET PER SECOND. VELOCITY IS IN FEET PER SECOND. CHANNEL DEPTH IS IN FEET. CHANNEL WIDTH IS IN FEET. CHANNEL AREA IS IN SQUARE FEET. CHANNEL VELOCITY IS IN FEET PER SECOND.

FINEWOOL WEANLING LAMBS

Characteristics of the finewool weanling lambs are presented in Tables 14 and 15. Weaning weight and type and condition scores have been adjusted to a constant age of 120 days and for the effects of age of dam and type of birth and rearing. Staple length has been adjusted to a constant age of 120 days.

Ram lambs averaged approximately four pounds heavier than ewe lambs in 1961 and over five pounds heavier than ewe lambs in 1962. The ram lambs also had slightly better body type and body condition scores than the ewe lambs in both years.

Weaning weights in 1961 and 1962 were almost the same. They were well above the ten year average, 1949-58. However, average weaning weights in 1961 and 1962 are four to six pounds lighter than those recorded in 1960. Staple length in 1961 was much longer than in previous years. 1962 staple lengths were approximately one-half a centimeter shorter than in 1961. Fiber diameter has remained fairly constant year to year.

The lambs in group 13 excel in staple length but have the poorest record in terms of medullated fibers. Group 25, the purebred Targhees, appear to wean the heaviest lambs and have the highest scoring lambs in body type and body condition. This group rates second behind group 13 in staple length. Group 20, the unselected control, rates at the bottom in all traits.

General and Particular

1870-1871

The following table shows the number of persons who have been admitted to the various departments of the University since the year 1870-1871, and the number who have graduated in each department.

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TABLE 14. FACE AND BODY TRAITS OF FINEWOL WEANLING LAMBS

<u>Year and breeding group No.</u>	<u>Sex</u>	<u>No. of lambs</u>	<u>Weaning weight (lbs.)</u>	<u>Body type score</u>	<u>Body condition score</u>	<u>Face covering score</u>	<u>Color score</u>
1961							
Group 13	Rams	67	68.9	1.94	2.02	-	1.00
20		62	55.0	2.10	2.13	-	1.34
21		75	68.9	1.93	2.09	-	1.08
22		51	65.3	2.12	2.21	-	1.06
25		30	71.6	1.99	2.08	-	1.07
13	Ewes	60	64.5	2.01	2.12	-	1.05
20		71	55.9	2.43	2.41	-	1.35
21		57	64.0	2.00	2.13	-	1.04
22		60	60.7	2.23	2.32	-	1.07
25		42	64.9	2.08	2.19	-	1.07
1962							
Group 13	Rams	53	68.4	2.05	2.09	3.3	1.49
20		42	61.1	2.75	2.79	3.9	1.79
21		52	66.7	2.30	2.28	3.6	1.81
22		60	67.8	2.25	2.24	3.5	1.72
25		30	70.0	1.97	2.00	3.5	1.50
13	Ewes	60	63.1	2.27	2.20	3.1	1.40
20		50	57.3	2.76	2.77	3.7	1.76
21		54	59.9	2.39	2.45	3.6	1.80
22		57	64.8	2.17	2.18	3.3	1.56
25		32	63.0	1.62	2.23	3.4	1.44
Totals and Averages							
1949-58	Rams	1025	59.9	2.93	2.84	2.8	-
	Ewes	1074	55.4	2.94	2.86	2.9	-
1959	Rams	194	59.6	3.29	3.90	3.1	1.10
	Ewes	216	53.6	3.38	3.96	3.0	1.17
1960	Rams	271	72.0	2.94	3.04	3.1	1.24
	Ewes	243	65.4	3.04	3.05	2.8	1.34
1961	Rams	285	65.5	2.01	2.10	-	1.11
	Ewes	290	61.6	2.17	2.25	-	1.13
1962	Rams	237	66.8	2.27	2.28	3.6	1.67
	Ewes	253	61.6	2.29	2.36	2.4	1.60

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5	I	1.5	5	I	1.5	5
6	I	1.6	6	I	1.6	6
7	I	1.7	7	I	1.7	7
8	I	1.8	8	I	1.8	8
9	I	1.9	9	I	1.9	9
10	I	1.10	10	I	1.10	10
11	I	1.11	11	I	1.11	11
12	I	1.12	12	I	1.12	12
13	I	1.13	13	I	1.13	13
14	I	1.14	14	I	1.14	14
15	I	1.15	15	I	1.15	15
16	I	1.16	16	I	1.16	16
17	I	1.17	17	I	1.17	17
18	I	1.18	18	I	1.18	18
19	I	1.19	19	I	1.19	19
20	I	1.20	20	I	1.20	20
21	I	1.21	21	I	1.21	21
22	I	1.22	22	I	1.22	22
23	I	1.23	23	I	1.23	23
24	I	1.24	24	I	1.24	24
25	I	1.25	25	I	1.25	25
26	I	1.26	26	I	1.26	26
27	I	1.27	27	I	1.27	27
28	I	1.28	28	I	1.28	28
29	I	1.29	29	I	1.29	29
30	I	1.30	30	I	1.30	30
31	I	1.31	31	I	1.31	31
32	I	1.32	32	I	1.32	32
33	I	1.33	33	I	1.33	33
34	I	1.34	34	I	1.34	34
35	I	1.35	35	I	1.35	35
36	I	1.36	36	I	1.36	36
37	I	1.37	37	I	1.37	37
38	I	1.38	38	I	1.38	38
39	I	1.39	39	I	1.39	39
40	I	1.40	40	I	1.40	40
41	I	1.41	41	I	1.41	41
42	I	1.42	42	I	1.42	42
43	I	1.43	43	I	1.43	43
44	I	1.44	44	I	1.44	44
45	I	1.45	45	I	1.45	45
46	I	1.46	46	I	1.46	46
47	I	1.47	47	I	1.47	47
48	I	1.48	48	I	1.48	48
49	I	1.49	49	I	1.49	49
50	I	1.50	50	I	1.50	50
51	I	1.51	51	I	1.51	51
52	I	1.52	52	I	1.52	52
53	I	1.53	53	I	1.53	53
54	I	1.54	54	I	1.54	54
55	I	1.55	55	I	1.55	55
56	I	1.56	56	I	1.56	56
57	I	1.57	57	I	1.57	57
58	I	1.58	58	I	1.58	58
59	I	1.59	59	I	1.59	59
60	I	1.60	60	I	1.60	60
61	I	1.61	61	I	1.61	61
62	I	1.62	62	I	1.62	62
63	I	1.63	63	I	1.63	63
64	I	1.64	64	I	1.64	64
65	I	1.65	65	I	1.65	65
66	I	1.66	66	I	1.66	66
67	I	1.67	67	I	1.67	67
68	I	1.68	68	I	1.68	68
69	I	1.69	69	I	1.69	69
70	I	1.70	70	I	1.70	70
71	I	1.71	71	I	1.71	71
72	I	1.72	72	I	1.72	72
73	I	1.73	73	I	1.73	73
74	I	1.74	74	I	1.74	74
75	I	1.75	75	I	1.75	75
76	I	1.76	76	I	1.76	76
77	I	1.77	77	I	1.77	77
78	I	1.78	78	I	1.78	78
79	I	1.79	79	I	1.79	79
80	I	1.80	80	I	1.80	80
81	I	1.81	81	I	1.81	81
82	I	1.82	82	I	1.82	82
83	I	1.83	83	I	1.83	83
84	I	1.84	84	I	1.84	84
85	I	1.85	85	I	1.85	85
86	I	1.86	86	I	1.86	86
87	I	1.87	87	I	1.87	87
88	I	1.88	88	I	1.88	88
89	I	1.89	89	I	1.89	89
90	I	1.90	90	I	1.90	90
91	I	1.91	91	I	1.91	91
92	I	1.92	92	I	1.92	92
93	I	1.93	93	I	1.93	93
94	I	1.94	94	I	1.94	94
95	I	1.95	95	I	1.95	95
96	I	1.96	96	I	1.96	96
97	I	1.97	97	I	1.97	97
98	I	1.98	98	I	1.98	98
99	I	1.99	99	I	1.99	99
100	I	2.00	100	I	2.00	100

TABLE 15. FLEECE CHARACTERISTICS OF FINEWOOL WEANLING LAMBS

Year and breeding group No.	Sex	No. of lambs	Fiber traits at side		
			Staple length (cms.)	Fiber diameter (microns)	Medullated fibers (percent)
1961					
Group 13	Rams	67	5.59	25.50	.62
20		62	2.74	20.80	.24
21		75	4.24	23.30	.30
22		51	4.01	21.90	.01
25		30	4.70	23.30	.17
13	Ewes	60	5.35	27.05	1.85
20		71	2.92	22.77	.21
21		57	4.49	24.78	.52
22		60	3.76	21.83	.06
25		42	4.47	24.30	.15
1962					
Group 13	Rams	53	4.11	24.44	.01
20		42	2.82	24.50	.00
21		52	3.37	20.51	.00
22		60	3.63	25.43	.00
25		30	3.79	22.23	.00
13	Ewes	60	4.61	25.14	.11
20		50	2.72	24.44	.00
21		54	3.42	20.36	.00
22		57	3.50	24.65	.00
25		32	3.93	24.12	.00
Totals & Averages					
1959	Rams	194	3.88	23.41	.09
	Ewes	216	4.25	24.27	.11
1960	Rams	271	2.95	24.42	.05
	Ewes	243	3.22	25.19	.11
1961	Rams	285	4.24	23.00	.30
	Ewes	290	4.11	24.96	.57
1962	Rams	237	3.55	23.24	.00
	Ewes	253	3.63	23.74	.00

SELECTION PRACTICED ON FINEWOOL WEANLING LAMBS

Selection differentials, the relative emphasis placed on each trait, and the expected genetic gains per generation are summarized in table 16. The selection differentials represent the average differences between the selected lambs and all lambs weaned after corrections for environmental influences have been made. Positive selection differentials for weaning weight are highly desirable and indicate selection of animals above average for this trait. With staple length, a positive selection differential is normally desirable, however, in these lambs a negative value for staple length usually indicates selection against the longer, coarser, and shaggier fleeces. Negative selection differentials for fiber diameter indicate selection of animals with finer fleeces, which is desirable. For all other traits, which are measured by the scoring method, the signs have been reversed so that a positive selection differential represents selection for the superior animals. The zero or very low selection differentials for color and outercoat scores indicate that the group is free or nearly free of these objectionable traits.

The relative emphasis placed on each trait, sometimes called the relative intensity of selection, is obtained by dividing the selection differential by the standard deviation.

The expected genetic gain per generation from selection in only one sex is the selection differential times one-half of the heritability. The sum of the products for both sexes gives the net expected genetic gain per generation from selection practiced at weanling age on both sexes. These are only tentative gains, however, because not all lambs saved at weaning will be permitted to produce offspring. This is especially true in the rams where considerable selection is practiced at later ages, but in the ewes most of the effective selection is made at weaning age.

All rams are culled in groups 21 and 22. Ewes saved from these groups are mated to rams obtained from other sources. The rams in groups 20, the control group, are selected at random, and it is noted that the selection differentials are generally quite small. It could not be expected that random selection would give zero selection differentials for all traits. Over a period of years, however, the positive selections should be more or less balanced by the negative selections. The ewe lambs in group 20 are also selected at random at weanling age.

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and development. It begins with the first settlers who came to the continent in search of a new home. These settlers were faced with many challenges, including a harsh climate and a lack of resources. Despite these difficulties, they persevered and built a new society. Over time, the United States grew from a small colony into a powerful nation. It fought wars, expanded its territory, and developed a unique culture. Today, the United States is a global superpower, with a strong economy and a significant influence on the world stage.

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SELECTION PRACTICED ON FINEWOOL WEANLING LAMBS, CONCLUDED.

Heritability estimates for all traits except face covering, color and outercoat scores were computed from the records of Navajo and Navajo crossbred lambs produced from 1947 to 1953, inclusive. They are applicable to the extent that they are still representative of the present sheep. The heritability estimate for face covering score is that obtained on range Targhee and Columbia lambs at the U. S. Sheep Experiment Station, Dubois, Idaho. Thus the estimate of the expected genetic gains per generation for face covering score is accurate only to the extent that the Dubois heritability estimate is representative of the lambs at this station. Heritabilities for color and outercoat scores have not been computed.

TABLE 16. SELECTION PRACTICED ON FINE WOOL WEANLING LAMBS

	Year	Sex	Breeding group number	Weaning weight (lbs.)	Type score	Condition score	Staple length (cms.)	Fiber diameter (microns)	Face covering score	Color score	Percent saved
Heritability				0.21	0.04	0.11	0.06	0.30	0.46	-	-
Selection differential	1961	Rams	13	2.33	0.02	0.11	-.05	0.10	-	0.02	42%
			20	0.40	-.14	-.05	-.05	0.80	-	-.16	27%
			21			NO RAMS SAVED					
			22			NO RAMS SAVED					
			25	-.08	0.00	0.00	-.01	0.00	-	-.07	97%
			25								
	1962	Rams	13	3.87	0.14	0.12	0.29	-.30	-.10	0.17	47%
			20	2.67	0.12	0.25	-.04	0.10	0.02	0.00	33%
			21			NO RAMS SAVED					
			22			NO RAMS SAVED					
			25	0.86	-.04	0.00	-.03	-.24	0.06	0.00	73%
			25								
		Ewes	13	5.61	0.11	0.11	0.14	-.51	0.16	0.03	50%
			20	0.03	0.01	0.09	0.00	0.29	0.00	0.00	50%
			21	4.49	0.18	0.22	0.27	-.08	0.16	0.03	46%
			22	2.54	0.06	0.07	0.16	0.00	0.32	-.07	45%
			25	3.76	0.12	0.18	0.08	-.22	0.09	0.07	87%
			25								
		Ewes	13	-.07	-.01	-.02	-.08	-.10	-	0.03	88%
			20			ALL EWES SAVED					
			21	2.00	0.08	0.13	0.03	0.01	-	0.03	65%
			22	1.19	0.03	0.03	0.02	0.20	-	0.00	84%
			25	0.20	0.01	0.02	0.03	0.01	-	-.07	98%
			25								

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Chapter LXXXIV	840
Chapter LXXXV	850
Chapter LXXXVI	860
Chapter LXXXVII	870
Chapter LXXXVIII	880
Chapter LXXXIX	890
Chapter LXXXX	900
Chapter LXXXXI	910
Chapter LXXXXII	920
Chapter LXXXXIII	930
Chapter LXXXXIV	940
Chapter LXXXXV	950
Chapter LXXXXVI	960
Chapter LXXXXVII	970
Chapter LXXXXVIII	980
Chapter LXXXXIX	990
Chapter LXXXXX	1000

TABLE 16, CONT. SELECTION PRACTICED ON FINE WOOL WEANLING LAMBS

Relative emphasis	Year	Sex	Breeding group number	Weaning weight (lbs.)	Type score	Condition score	Staple length (cms.)	Fiber diameter (microns)	Face covering score	Color score	Percent saved
1961	Rams		13	0.2298	0.0205	0.5090	-0.0493	0.0589	-	0.0935	42%
			20	0.0610	-0.3015	-0.1323	-0.0734	0.6379	-	-0.2328	27%
			21			NO RAMS SAVED					
			22			NO RAMS SAVED					
			25	-0.0102	0.00	0.00	-0.0095	0.00	-	-0.1916	97%
	Ewes		13	-0.0086	-0.0359	-0.0581	-0.1023	-0.0479	-	0.1365	86%
			20			ALL EWES SAVED			-	0.1819	65%
			21	0.7991	0.2698	0.3533	0.0708	0.0061	-	0.00	84%
			22	0.2292	0.1188	0.1145	0.0951	0.0839	-	0.00	98%
			25	0.0237	0.0251	0.0540	0.0572	0.0050	-	-0.1720	
1962	Rams		13	0.6159	0.4633	0.3052	0.3619	-0.1247	-0.1527	0.3368	47%
			20	0.0610	-0.3015	-0.1323	-0.0734	0.6379	0.0212	-0.2328	33%
			21			NO RAMS SAVED					
			22			NO RAMS SAVED					
			25	0.0906	-0.1171	0.00	-0.0626	-0.1076	0.0880	0.00	73%
	Ewes		13	0.6662	0.3545	0.3212	0.1753	-0.2198	0.2142	0.0569	50%
			20	0.0042	0.0300	0.1793	0.00	0.1363	0.00	0.00	50%
			21	0.5796	0.4844	0.4963	0.3555	-0.0412	0.2377	0.0792	46%
			22	0.3977	0.1595	0.1496	0.2296	0.00	0.4073	-0.2607	45%
			25	0.3064	0.2249	0.2710	0.0774	-0.0888	0.1364	0.5032	87%

TABLE 16, CONT. SELECTION PRACTICED ON FINE WOOL WEANLING LAMBS

Expected genetic gain	Year	Sex	Breeding group number	Weaning weight (lbs.)	Type score	Condition score	Staple length (cms.)	Fiber diameter (microns)	Face covering score	Percent saved
1961	Rams		13	0.2477	0.0004	0.0061	0.0015	0.0150	-	42%
			20	0.0420	-.0028	-.0028	-.0015	0.1200	-	27%
			21			NO RAMS NO RAMS SAVED				
			22			NO RAMS NO RAMS SAVED				
			25	-.0084	0.00	0.00	-.0315	0.00	-	97%
			13	-.0073	-.0002	-.0011	-.0024	-.0150	-	88%
			20			ALL EWES ALL EWES SAVED				
			21	0.2100	0.0016	0.0071	0.0009	0.0015	-	65%
			22	0.1249	0.0006	0.0017	0.0006	0.0300	-	84%
			25	0.0210	0.0002	0.0011	0.0009	0.0015	-	98%
1962	Rams		13	0.4063	0.0028	0.0066	0.0087	-.0450	-.0230	47%
			20	0.2803	0.0024	0.0137	-.0012	0.0150	0.0046	33%
			21			NO RAMS NO RAMS SAVED				
			22			NO RAMS NO RAMS SAVED				
			25	0.9970	-.0008	0.00	-.0009	-.0360	0.0138	73%
			13	0.5890	0.0022	0.0605	0.0042	-.0765	0.0037	50%
			20	0.0031	0.0002	0.0049	0.00	0.0435	0.00	50%
			21	0.4715	0.0036	0.0121	0.0081	-.0120	0.0368	46%
			22	0.2667	0.0012	0.0038	0.0048	0.00	0.0736	45%
			25	0.3948	0.0024	0.0099	0.0024	-.0330	0.0207	87%
1962	Ewes		13	0.5890	0.0022	0.0605	0.0042	-.0765	0.0037	50%
			20	0.0031	0.0002	0.0049	0.00	0.0435	0.00	50%
			21	0.4715	0.0036	0.0121	0.0081	-.0120	0.0368	46%
			22	0.2667	0.0012	0.0038	0.0048	0.00	0.0736	45%
			25	0.3948	0.0024	0.0099	0.0024	-.0330	0.0207	87%
			13	0.5890	0.0022	0.0605	0.0042	-.0765	0.0037	50%
			20	0.0031	0.0002	0.0049	0.00	0.0435	0.00	50%
			21	0.4715	0.0036	0.0121	0.0081	-.0120	0.0368	46%
			22	0.2667	0.0012	0.0038	0.0048	0.00	0.0736	45%
			25	0.3948	0.0024	0.0099	0.0024	-.0330	0.0207	87%

FINEWOL YEARLING EWES AND RAMS

Characteristics of the finewool yearling ewes and rams are presented in Tables 17 and 18. Body weights and type and condition scores were recorded in June at approximately 400 days of age. All other traits were measured in April at shearing time, or a few days before. Body weights have been adjusted to 400 days of age, while staple length and fleece weights have been corrected to 365 days of age. In addition, these traits in the ewes have also been adjusted for the effects of age of dam and type of birth and rearing. Correction factors for the yearling rams have not been determined.

Body weight in the improved groups continues to show gradual improvement. The unselected controls (group 20) tend to fluctuate around 82 pounds for the ewes and 110 pounds for the rams. Average staple lengths have risen steadily since 1959. In 1962, grease fleece weight of the rams was below 1961 but clean fleece weight was higher. This would indicate cleaner, lower shrinking fleeces in 1962.

TABLE 17. BODY WEIGHTS AND SCORES OF FINEWOOL YEARLINGS

<u>Year</u>	<u>Sex</u>	<u>Breeding group number</u>	<u>No.of sheep</u>	<u>Body weight (lbs.)</u>	<u>Body type score</u>	<u>Body condition score</u>	<u>Face covering score</u>	<u>Color score</u>	
1961	Rams	13	15	125.3	1.64	1.70	2.35	1.00	
		20	13	113.3	2.29	2.25	3.34	1.00	
		25	19	124.3	1.49	1.30	2.98	1.00	
	Ewes	13	47	88.5	2.24	2.19	2.25	1.06	
		20	60	83.0	2.65	2.67	2.51	2.22	
		21	31	84.4	2.42	2.34	2.95	1.00	
		22	41	88.0	2.33	2.20	2.30	1.05	
		25	17	83.4	2.15	2.20	2.18	1.00	
	1962	Rams	13	24	125.0	1.85	1.76	2.41	1.14
			20	10	110.0	2.68	2.51	3.66	2.37
25			28	131.0	1.75	1.61	3.48	1.03	
Ewes		13	53	88.9	2.13	1.98	2.56	1.06	
		20	72	82.1	2.62	2.40	3.41	1.39	
		21	38	89.5	2.22	2.02	3.35	1.07	
		22	47	89.5	2.19	2.01	2.86	1.04	
		25	39	90.3	2.06	1.96	2.84	1.03	
Totals and averages									
1959		Rams		41	115.5	2.91	2.49	3.01	1.29
	Ewes		154	88.7	2.79	2.35	2.49	1.29	
1960	Rams		38	128.6	2.22	1.85	2.24	1.24	
	Ewes		184	90.5	2.65	2.56	2.13	1.20	
1961	Rams		47	119.1	1.71	1.65	2.88	1.13	
	Ewes		196	86.2	2.40	2.39	2.46	1.40	
1962	Rams		62	125.6	1.94	1.82	3.10	1.18	
	Ewes		249	87.0	2.27	2.10	3.05	1.15	

TABLE 1.1. MEAN MONTHLY AND ANNUAL RAINFALL (INCHES)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1941	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	3.8
1942	1.1	1.4	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	3.7
1943	1.3	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	3.9
1944	1.4	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	4.0
1945	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	4.1
1946	1.6	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	4.2
1947	1.7	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	4.3
1948	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	4.4
1949	1.9	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	4.5
1950	2.0	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	4.6
1951	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	4.7
1952	2.2	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	4.8
1953	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	4.9
1954	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	5.0
1955	2.5	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	5.1
1956	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	5.2
1957	2.7	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	5.3
1958	2.8	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	5.4
1959	2.9	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	5.5
1960	3.0	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	5.6
1961	3.1	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	5.7
1962	3.2	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	5.8
1963	3.3	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	5.9
1964	3.4	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	6.0
1965	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	6.1
1966	3.6	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	6.2
1967	3.7	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	6.3
1968	3.8	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	6.4
1969	3.9	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	6.5
1970	4.0	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	6.6
1971	4.1	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	6.7
1972	4.2	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	6.8
1973	4.3	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	6.9
1974	4.4	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	7.0
1975	4.5	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	7.1
1976	4.6	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	7.2
1977	4.7	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	7.3
1978	4.8	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	7.4
1979	4.9	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	7.5
1980	5.0	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	7.6
1981	5.1	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	7.7
1982	5.2	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	7.8
1983	5.3	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	7.9
1984	5.4	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	8.0
1985	5.5	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	8.1
1986	5.6	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	8.2
1987	5.7	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	8.3
1988	5.8	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	8.4
1989	5.9	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	8.5
1990	6.0	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	8.6
1991	6.1	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	8.7
1992	6.2	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5	8.8
1993	6.3	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	8.9
1994	6.4	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	9.0
1995	6.5	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5	9.8	9.1
1996	6.6	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9	9.2
1997	6.7	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	9.3
1998	6.8	7.1	7.4	7.7	8.0	8.3	8.6	8.9	9.2	9.5	9.8	10.1	9.4
1999	6.9	7.2	7.5	7.8	8.1	8.4	8.7	9.0	9.3	9.6	9.9	10.2	9.5
2000	7.0	7.3	7.6	7.9	8.2	8.5	8.8	9.1	9.4	9.7	10.0	10.3	9.6

TABLE 18. FLEECE CHARACTERISTICS OF FINEWOOL YEARLINGS

Year	Sex	Breeding group number	No. of sheep	Fleece weights		Staple length (cms.)	Fiber diameter (microns)	Outer- coat score	Percent medull- ated fibers	
				Grease (lbs.)	Clean (lbs.)					
1961	Rams	13	15	9.81	4.95	9.73	24.1	1.00	-	
		20	13	6.30	3.11	5.61	22.2	1.00	-	
		25	19	8.90	4.24	8.72	22.7	1.00	-	
	Ewes	13	47	6.63	3.12	8.66	23.3	1.02	-	
		20	60	5.08	2.35	5.69	21.3	1.00	-	
		21	31	6.90	2.93	7.18	20.3	.99	-	
		22	41	6.50	3.05	7.73	22.1	1.00	-	
		25	17	6.26	2.98	7.67	22.8	.99	-	
	1962	Rams	13	24	7.98	4.90	9.70	22.7	1.07	.02
			20	10	5.74	3.63	6.50	21.6	.92	.01
25			28	8.24	4.68	8.80	20.4	1.03	.01	
Ewes		13	53	6.67	3.64	10.36	23.6	1.40	.00	
		20	72	5.52	2.99	6.67	21.7	1.07	.00	
		21	38	6.88	3.48	8.11	20.2	1.08	.00	
Totals & Averages	1959	Rams	41	6.37	3.20	7.20	21.6	1.00	.00	
		Ewes	154	6.36	2.93	7.19	20.1	1.06	.03	
	1960	Rams	38	7.33	3.41	7.44	24.4	1.04	.01	
		Ewes	187	6.82	3.32	6.60	22.5	1.01	.04	
	1961	Rams	47	8.47	4.17	8.18	23.0	1.00	-	
		Ewes	196	6.11	2.83	7.24	22.6	1.01	-	
	1962	Rams	62	7.79	4.60	8.81	21.2	.99	.01	
		Ewes	249	6.45	3.43	8.35	21.7	1.15	.00	

TABLE 1. - SUMMARY OF DATA FOR THE 1950-51 FLOODING

Source: U.S. Army Corps of Engineers, District of Columbia, Washington, D.C.

Station	Location	Channel	Area	Volume	Depth	Velocity	Discharge	Notes
1	St. Louis	Missouri	1,000	100,000	10	10	100,000	
2	St. Louis	Missouri	1,000	100,000	10	10	100,000	
3	St. Louis	Missouri	1,000	100,000	10	10	100,000	
4	St. Louis	Missouri	1,000	100,000	10	10	100,000	
5	St. Louis	Missouri	1,000	100,000	10	10	100,000	
6	St. Louis	Missouri	1,000	100,000	10	10	100,000	
7	St. Louis	Missouri	1,000	100,000	10	10	100,000	
8	St. Louis	Missouri	1,000	100,000	10	10	100,000	
9	St. Louis	Missouri	1,000	100,000	10	10	100,000	
10	St. Louis	Missouri	1,000	100,000	10	10	100,000	
11	St. Louis	Missouri	1,000	100,000	10	10	100,000	
12	St. Louis	Missouri	1,000	100,000	10	10	100,000	
13	St. Louis	Missouri	1,000	100,000	10	10	100,000	
14	St. Louis	Missouri	1,000	100,000	10	10	100,000	
15	St. Louis	Missouri	1,000	100,000	10	10	100,000	
16	St. Louis	Missouri	1,000	100,000	10	10	100,000	
17	St. Louis	Missouri	1,000	100,000	10	10	100,000	
18	St. Louis	Missouri	1,000	100,000	10	10	100,000	
19	St. Louis	Missouri	1,000	100,000	10	10	100,000	
20	St. Louis	Missouri	1,000	100,000	10	10	100,000	
21	St. Louis	Missouri	1,000	100,000	10	10	100,000	
22	St. Louis	Missouri	1,000	100,000	10	10	100,000	
23	St. Louis	Missouri	1,000	100,000	10	10	100,000	
24	St. Louis	Missouri	1,000	100,000	10	10	100,000	
25	St. Louis	Missouri	1,000	100,000	10	10	100,000	
26	St. Louis	Missouri	1,000	100,000	10	10	100,000	
27	St. Louis	Missouri	1,000	100,000	10	10	100,000	
28	St. Louis	Missouri	1,000	100,000	10	10	100,000	
29	St. Louis	Missouri	1,000	100,000	10	10	100,000	
30	St. Louis	Missouri	1,000	100,000	10	10	100,000	
31	St. Louis	Missouri	1,000	100,000	10	10	100,000	
32	St. Louis	Missouri	1,000	100,000	10	10	100,000	
33	St. Louis	Missouri	1,000	100,000	10	10	100,000	
34	St. Louis	Missouri	1,000	100,000	10	10	100,000	
35	St. Louis	Missouri	1,000	100,000	10	10	100,000	
36	St. Louis	Missouri	1,000	100,000	10	10	100,000	
37	St. Louis	Missouri	1,000	100,000	10	10	100,000	
38	St. Louis	Missouri	1,000	100,000	10	10	100,000	
39	St. Louis	Missouri	1,000	100,000	10	10	100,000	
40	St. Louis	Missouri	1,000	100,000	10	10	100,000	
41	St. Louis	Missouri	1,000	100,000	10	10	100,000	
42	St. Louis	Missouri	1,000	100,000	10	10	100,000	
43	St. Louis	Missouri	1,000	100,000	10	10	100,000	
44	St. Louis	Missouri	1,000	100,000	10	10	100,000	
45	St. Louis	Missouri	1,000	100,000	10	10	100,000	
46	St. Louis	Missouri	1,000	100,000	10	10	100,000	
47	St. Louis	Missouri	1,000	100,000	10	10	100,000	
48	St. Louis	Missouri	1,000	100,000	10	10	100,000	
49	St. Louis	Missouri	1,000	100,000	10	10	100,000	
50	St. Louis	Missouri	1,000	100,000	10	10	100,000	

RESEARCH PROJECT AH - b1 - 12

IMPROVEMENT OF COARSE WOOL SHEEP FOR THE
PRODUCTION OF WOOL SUITABLE FOR NAVAJO HAND WEAVING

The objectives of this project are to develop and improve crossbred sheep producing quarter, or low quarter blood wool, suitable for Navajo hand weaving, which are adapted to southwestern ranges, and to provide a source of rams for Navajo producers of weaving wool. Part of the wool produced by Navajos is woven into rugs and blankets, which adds to their rather meager income. Consequently, production of wool suitable for hand weaving is still important to the Navajo economy. Emphasis has been placed on selecting breeding animals displaying hardiness, adaptability, body size, good staple length, and clean wool production.

TABLE 19. CHARACTERISTICS OF COARSEWOOL BREEDING RAMS, AS YEARLINGS

Year and breeding group No.	No. of rams	Age at lambing (years)	Yearling body weight (lbs.)	Yearling fleece weights		Fiber traits at side			Medul- lated fibers (percent)
				Grease (lbs.)	Clean (lbs.)	Staple length (cms.)	Fiber diameter (microns)	U.S. grade	
1961									
Group 16	4	2.0	147.0	8.02	4.31	11.7	31.4	50's	0.00
23	10	2.5	130.5	7.04	3.89	11.3	29.4	54's	1.44
1962									
Group 16	5	2.6	144.0	7.93	4.60	12.0	28.3	56's	0.00
23	11	2.3	137.7	8.21	5.05	11.9	29.4	54's	0.00
Totals and averages									
1950-56	118	3.4	121.7	8.56	5.03	12.2	30.1	50's	0.03
1957-61	68	2.6	110.8	6.33	3.84	10.9	27.1	56's	1.20
1961	14	2.4	135.2	7.33	4.00	11.4	30.0	54's	1.03
1962	16	2.4	139.7	8.13	4.91	11.9	29.1	54's	0.00

COARSEWOOL BREEDING FLOCK

Characteristics of the coarsewool rams and ewes that were used for breeding in the years 1961 and 1962 are presented in Tables 19 and 20. The rams that were used in groups 16 and 23 are of the same breeding, and were produced in group 16. The procedure has been to select the four phenotypically best yearling rams each fall for use in group 16. If these rams produce satisfactory progeny, they are used the following year in breeding group 23. The remainder of the ten sires used in group 23 are made up of the second choice yearling and mature rams from group 16.

The breeding ewes of group 23 are composed of offspring of average Navajo reservation ewes bred to group 16 rams. Most of the ewes are second and third crosses. The ewes in group 23 are approaching group 16 in all traits except fiber diameter and staple length. As more third and fourth crosses are used in the breeding flock, all traits of group 23 ewes should become approximately equal to the corresponding traits of group 16 ewes.

1. 1990年12月25日，在“九七”香港回归前夕，香港各界人士纷纷发表文章，就香港前途问题提出自己的看法。

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Journal of Management Studies, 19(1), 67-80.

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the 1990s, the number of people in the world who are illiterate has increased from 1.2 billion to 1.5 billion. The number of illiterate people in the world is projected to reach 1.7 billion by the year 2015. The number of illiterate people in the world is projected to reach 1.7 billion by the year 2015.

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TABLE 20. CHARACTERISTICS OF COARSEWOOL BREEDING EWES, AS YEARLINGS

Year and breeding group No.	No. of ewes	Age at lambing (years)	18 Mos. body weight (lbs.)	Yearling fleece weight		Fiber traits at side			
				Grease (lbs.)	Clean (lbs.)	Staple length (cms.)	Fiber diameter (microns)	U.S. grade	Medul- lated fibers (percent)
1961									
Group 16	119	4.0	107.6	5.76	3.34	10.4	26.2	58's	0.30
23	107	3.9	107.6	5.63	3.23	7.8	23.9	62's	0.28
1962									
Group 16	111	3.7	110.6	5.76	3.37	10.1	27.9	56's	0.33
23	110	3.6	108.4	5.82	3.42	8.2	25.6	58's	0.20
Totals and averages									
1950-56	2778	4.1	102.7	6.50	3.60	10.2	-	60's	0.55
1957-61	1058	3.8	103.7	5.38	3.04	8.9	23.8	62's	0.16
1961	226	4.0	107.6	5.70	3.29	9.2	25.1	60's	0.17
1962	221	3.6	109.5	5.79	3.39	9.1	26.7	58's	0.17

LAMB PRODUCTION OF COARSEWOOL MATINGS

Table 21 summarizes the lamb production of the coarsewool ewes for the years 1961 and 1962. For the period 1937 through 1951, the percent of ewes lambing is based on the number of ewes bred and surviving to lambing time. The newer method of computation gives an indication of fertility that is not confounded with post-breeding death losses. However, this percentage is affected by the fertility of both rams and ewes. The percent of lambs born minus 100 gives the rate of twin births. The percent of lambs weaned of live lambs born measures the survival rate of lambs from birth to weaning age. Prior to 1947, average weaning weights and pounds of lamb weaned per ewe bred were based on weights taken at about 140 days of age and unadjusted for any measurable environmental factors. From 1947 to date, the weights are adjusted to a constant age of 120 days and are corrected for age of dam and type of birth and rearing.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY

of the University of Chicago
The following is a list of the
members of the Department of the
History of the University of Chicago
who have been elected to the
rank of Associate Professor
since the last meeting of the
Department. The names are
listed in alphabetical order.
The names of the members of the
Department who have been elected
to the rank of Professor since
the last meeting of the
Department are listed in
alphabetical order.

TABLE 21. LAMB PRODUCTION OF COARSEWOOL MATINGS

<u>Year and breeding group No.</u>	<u>No. of ewes bred</u>	<u>Percent of ewes lambing</u>	<u>Percent lambs born of ewes lambing</u>	<u>Average birth weight (lbs.)</u>	<u>Percent lambs weaned of: ewes lambs born bred alive</u>		<u>Average weaning weight (lbs.)</u>	<u>Pounds of lamb per ewe bred</u>
1937-41	1216	88.3	126.0	-	97.1	88.8	59.9	58.2
1942-46	1794	79.8	140.6	-	89.4	81.3	59.4	53.1
1947-51	3864	79.4	129.0	-	76.6	76.2	57.9	44.3
1952-56	1822	89.4	115.0	-	81.0	84.3	60.1	48.6
1957-61	1060	86.5	118.3	9.13	90.5	89.8	64.0	56.9
1961								
Group 16	120	60.8	124.7	9.93	71.7	94.5	69.3	47.0
23	107	84.1	130.0	9.83	99.1	95.6	68.4	64.0
1962								
Group 16	111	89.2	128.3	9.99	100.0	91.7	65.2	65.2
23	110	78.2	129.1	10.34	89.1	88.3	63.8	56.9

COARSEWOOL WEANLING LAMBS

Fleece and body characteristics of the coarsewool weanling lambs are summarized in Tables 22 and 23. Weaning weights and type and condition scores are adjusted to a constant age of 120 days and for the effects of age of dam and type of birth and rearing. Staple length is corrected to a constant age of 120 days.

Weaning weights in 1961 and 1962 are well above those of previous years, with the exception of 1960. The 1960 weights were the heaviest ever recorded

Color scores, body type and body condition scores show continued improvement over previous years. This improvement in scores is not directly comparable year to year, however. The score recorded for an animal is an average of the score given the animal by each member of a three-man committee. The committee members differ each year, but all scores recorded within one year are by the same committee. This would make scores of different breeding groups within a year comparable.

Percent medullated fibers increased considerably in 1961, then dropped sharply in 1962. No apparent reason can be given for these changes.

1. The first step in the process of the investigation is the identification of the problem. This is done by the investigator who is responsible for the study. The investigator must first identify the problem that is being investigated. This is done by the investigator who is responsible for the study.

1. 1990年12月15日，在“九七”香港回归前，香港各界人士纷纷发表文章，就香港前途问题提出自己的看法。

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1. The first step is to identify the problem. This involves understanding the situation and the goals that need to be achieved.

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TABLE 22. FACE AND BODY TRAITS OF COARSEWOOL WEANLING LAMBS

Year and breeding group No.		Sex	No. of lambs	Adjusted:			Face covering score	Color score
				Weaning weight (lbs.)	Body type score	Body condition score		
1957								
Group 16	23	Rams	35	66.2	2.37	2.66	2.85	1.69
			46	68.0	2.39	2.43	3.05	1.87
16	23	Ewes	46	59.8	2.48	2.60	2.77	1.67
			27	61.0	2.43	2.57	2.75	2.11
1958								
Group 16	23	Rams	32	54.7	3.03	3.50	2.83	1.63
			47	56.9	3.04	3.60	3.05	1.80
16	23	Ewes	46	54.2	3.27	3.47	2.76	1.57
			40	53.3	2.97	3.49	2.82	1.85
1959								
Group 16	23	Rams	55	59.7	3.33	4.03	2.77	1.49
			54	60.4	3.19	3.82	2.90	1.57
16	23	Ewes	50	54.0	3.40	4.06	2.68	1.58
			47	56.2	3.28	3.94	2.52	1.49
1960								
Group 16	23	Rams	57	74.0	2.84	3.13	2.58	1.44
			66	73.5	2.78	3.05	2.57	1.27
16	23	Ewes	60	67.6	2.84	3.15	2.43	1.53
			55	65.0	2.90	3.13	2.53	1.33
1961								
Group 16	23	Rams	47	72.7	2.00	2.07	-	1.39
			51	69.8	1.80	1.93	-	1.08
16	23	Ewes	36	64.8	2.08	2.19	-	1.42
			56	65.8	2.03	2.16	-	1.17
1962								
Group 16	23	Rams	57	69.9	2.03	2.13	3.36	1.19
			47	70.1	2.04	2.12	3.45	1.38
16	23	Ewes	50	67.9	2.06	2.24	3.16	1.28
			48	64.9	2.09	2.15	3.17	1.19

TABLE 23. FLEECE CHARACTERISTICS OF COARSEWOOL WEANLING LAMBS

<u>Year and breeding group No.</u>	<u>Sex</u>	<u>No. of lambs</u>	<u>Staple length (cms.)</u>	<u>Fiber diameter (microns)</u>	<u>Medullated fibers (percent)</u>	<u>Kemp fibers (percent)</u>
1957						
Group 16 23	Rams	35	6.13	30.5	3.46	.02
		46	3.81	27.0	2.41	.08
16 23	Ewes	36	6.39	30.3	2.21	.00
		27	3.70	25.3	.36	.00
1958						
Group 16 23	Rams	32	5.77	27.4	.72	.00
		47	3.84	26.4	.57	.02
16 23	Ewes	46	6.30	28.5	.44	.00
		40	4.87	25.4	.15	.01
1959						
Group 16 23	Rams	55	6.68	30.2	2.97	.15
		54	5.41	27.7	.82	.00
16 23	Ewes	50	7.32	31.5	3.09	.28
		47	6.14	31.1	.91	.00
1960						
Group 16 23	Rams	57	4.74	31.0	.14	.00
		66	3.92	28.8	.34	.00
16 23	Ewes	60	5.67	33.2	.23	.01
		55	4.40	29.6	1.28	.00
1961						
Group 16 23	Rams	47	7.38	29.3	4.86	*-
		51	5.80	29.0	3.88	-
16 23	Ewes	36	6.75	31.1	5.56	-
		56	6.43	30.7	4.12	-
1962						
Group 16 23	Rams	57	6.10	28.0	.02	-
		47	5.38	28.6	.03	-
16 23	Ewes	50	6.24	28.0	.06	-
		48	5.41	29.3	.02	-

TABLE 1. SUMMARY OF DATA FOR THE 1970-1971 SEASON						
STATION	DATE	TIME	WIND DIRECTION	WIND SPEED (MPH)	WAVE HEIGHT (FT)	SEA STATE
1	10/10/70	0800	090	12	3	2
2	10/10/70	1200	090	15	4	3
3	10/10/70	1600	090	18	5	4
4	10/10/70	2000	090	20	6	5
5	10/11/70	0600	090	10	2	1
6	10/11/70	1000	090	12	3	2
7	10/11/70	1400	090	15	4	3
8	10/11/70	1800	090	18	5	4
9	10/12/70	0700	090	10	2	1
10	10/12/70	1100	090	12	3	2
11	10/12/70	1500	090	15	4	3
12	10/12/70	1900	090	18	5	4
13	10/13/70	0600	090	10	2	1
14	10/13/70	1000	090	12	3	2
15	10/13/70	1400	090	15	4	3
16	10/13/70	1800	090	18	5	4
17	10/14/70	0700	090	10	2	1
18	10/14/70	1100	090	12	3	2
19	10/14/70	1500	090	15	4	3
20	10/14/70	1900	090	18	5	4
21	10/15/70	0600	090	10	2	1
22	10/15/70	1000	090	12	3	2
23	10/15/70	1400	090	15	4	3
24	10/15/70	1800	090	18	5	4
25	10/16/70	0700	090	10	2	1
26	10/16/70	1100	090	12	3	2
27	10/16/70	1500	090	15	4	3
28	10/16/70	1900	090	18	5	4
29	10/17/70	0600	090	10	2	1
30	10/17/70	1000	090	12	3	2
31	10/17/70	1400	090	15	4	3
32	10/17/70	1800	090	18	5	4
33	10/18/70	0700	090	10	2	1
34	10/18/70	1100	090	12	3	2
35	10/18/70	1500	090	15	4	3
36	10/18/70	1900	090	18	5	4
37	10/19/70	0600	090	10	2	1
38	10/19/70	1000	090	12	3	2
39	10/19/70	1400	090	15	4	3
40	10/19/70	1800	090	18	5	4
41	10/20/70	0700	090	10	2	1
42	10/20/70	1100	090	12	3	2
43	10/20/70	1500	090	15	4	3
44	10/20/70	1900	090	18	5	4
45	10/21/70	0600	090	10	2	1
46	10/21/70	1000	090	12	3	2
47	10/21/70	1400	090	15	4	3
48	10/21/70	1800	090	18	5	4
49	10/22/70	0700	090	10	2	1
50	10/22/70	1100	090	12	3	2
51	10/22/70	1500	090	15	4	3
52	10/22/70	1900	090	18	5	4
53	10/23/70	0600	090	10	2	1
54	10/23/70	1000	090	12	3	2
55	10/23/70	1400	090	15	4	3
56	10/23/70	1800	090	18	5	4
57	10/24/70	0700	090	10	2	1
58	10/24/70	1100	090	12	3	2
59	10/24/70	1500	090	15	4	3
60	10/24/70	1900	090	18	5	4
61	10/25/70	0600	090	10	2	1
62	10/25/70	1000	090	12	3	2
63	10/25/70	1400	090	15	4	3
64	10/25/70	1800	090	18	5	4
65	10/26/70	0700	090	10	2	1
66	10/26/70	1100	090	12	3	2
67	10/26/70	1500	090	15	4	3
68	10/26/70	1900	090	18	5	4
69	10/27/70	0600	090	10	2	1
70	10/27/70	1000	090	12	3	2
71	10/27/70	1400	090	15	4	3
72	10/27/70	1800	090	18	5	4
73	10/28/70	0700	090	10	2	1
74	10/28/70	1100	090	12	3	2
75	10/28/70	1500	090	15	4	3
76	10/28/70	1900	090	18	5	4
77	10/29/70	0600	090	10	2	1
78	10/29/70	1000	090	12	3	2
79	10/29/70	1400	090	15	4	3
80	10/29/70	1800	090	18	5	4
81	10/30/70	0700	090	10	2	1
82	10/30/70	1100	090	12	3	2
83	10/30/70	1500	090	15	4	3
84	10/30/70	1900	090	18	5	4
85	10/31/70	0600	090	10	2	1
86	10/31/70	1000	090	12	3	2
87	10/31/70	1400	090	15	4	3
88	10/31/70	1800	090	18	5	4
89	11/01/70	0700	090	10	2	1
90	11/01/70	1100	090	12	3	2
91	11/01/70	1500	090	15	4	3
92	11/01/70	1900	090	18	5	4
93	11/02/70	0600	090	10	2	1
94	11/02/70	1000	090	12	3	2
95	11/02/70	1400	090	15	4	3
96	11/02/70	1800	090	18	5	4
97	11/03/70	0700	090	10	2	1
98	11/03/70	1100	090	12	3	2
99	11/03/70	1500	090	15	4	3
100	11/03/70	1900	090	18	5	4

SELECTION OF COARSEWOOL WEANLING LAMBS

Selection differentials, the relative emphasis placed on each trait, and the expected genetic gains per generation are presented in table 24. As noted for the previous sections: the selection differential is the difference between the average of the saved lambs and the average of all lambs from which they were selected; the relative emphasis is the ratio of the selection differential to the standard deviation; and the expected genetic gain per generation in one sex is one-half the heritability times the selection differential. Where selection is practiced in both sexes, the expected genetic gain per generation is the sum of the values of the two sexes. Naturally these are only tentative gains, since all animals selected will not produce offspring.

For all traits that are measured by means of scores, the signs have been reversed so that a positive value indicates improvement for that trait. In the other traits which are measured quantitatively (weaning weight, staple length, and fiber diameter), the signs are untouched, so that a positive value means an increase in the unit of measurement for that trait. Greatest emphasis has been placed on weaning weight, type, condition and outercoat scores. Since only about one-third of the ram lambs are saved each year, it has been possible to exert greater selection pressure on them than on the ewe lambs, where two thirds or more are saved each year.

TABLE 24. SELECTION PRACTICED ON COARSEWOOL WEANLING LAMBS

	Year	Sex	Breeding group number	Weaning weight (lbs.)	Type score	Condition score	Staple length (cms.)	Fiber diameter (microns)	Face covering score	Color score	Percent saved
Heritability				0.21	0.04	0.11	0.06	0.30	0.46	-	
Selection differential	1961	Rams	16	1.62	0.12	0.18	1.36	0.20	-	0.19	34%
			23			ALL RAMS CULLED					
		Ewes	16	1.28	0.01	0.06	- .003	0.20	-	0.09	67%
			23	1.39	0.04	0.05	- .24	0.2	-	0.13	43%
		1962 Rams	16	6.13	0.18	0.18	0.61	0.66	0.26	- .04	27%
			23			ALL RAMS CULLED					
Relative emphasis	1961	Rams	16	0.1894	0.3996	0.4512	- .0999	0.0827	-	0.3757	27%
			23								
		Ewes	16	0.1648	0.0399	0.5150	- .0026	0.0781	-	0.1793	60%
			23	0.2134	0.1363	0.1838	- .1810	0.0960	-	0.3891	54%
		1962 Rams	16	0.8229	0.4622	0.4451	0.4295	0.3128	0.3589	- .0966	27%
			23								
		Ewes	16	0.4421	0.0285	0.0951	0.1914	0.1724	- .0821	0.0890	60%
			23	0.4017	0.4691	0.4714	0.4274	0.4909	0.1284	0.0	54%

TABLE 24, CONT. SELECTION PRACTICED ON COARSEWOOL WEANLING LAMBS

<u>Expected genetic gain</u>	<u>Year</u>	<u>Sex</u>	<u>Breeding group number</u>	<u>Weaning weight (lbs.)</u>	<u>Type score</u>	<u>Condition score</u>	<u>Staple length (cms.)</u>	<u>Fiber diameter (microns)</u>	<u>Face covering score</u>	<u>Percent saved</u>
	1961	Rams	16	0.1701	0.0024	0.0099	- .0007	0.0300	-	27%
		Ewes	16	0.1344	0.0002	0.0033	- .0001	0.0300	-	60%
			23	0.6837	0.0008	0.0033	0.0072	0.0300	-	54%
	1962	Rams	16	0.6436	0.0036	0.0099	0.0183	0.0990	0.0598	27%
		Ewes	16	0.3024	0.0002	0.0016	0.0132	0.0600	- .0092	60%
			23	0.6227	0.0044	0.0143	0.0159	0.2025	0.0230	54%

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Table of the ...

No.	Name	Age	Sex	Profession	Religion	Marital Status	Education	Income	Assets	Liabilities	Net Worth
1	John Doe	35	M	Teacher	Protestant	Married	High School	\$12,000	\$50,000	\$10,000	\$40,000
2	Jane Smith	28	F	Nurse	Catholic	Single	College	\$8,000	\$20,000	\$5,000	\$15,000
3	Robert Johnson	45	M	Engineer	Jewish	Married	University	\$15,000	\$75,000	\$15,000	\$60,000
4	Mary White	52	F	Homemaker	Methodist	Married	High School	\$6,000	\$30,000	\$8,000	\$22,000
5	William Brown	30	M	Doctor	Buddhist	Single	University	\$20,000	\$100,000	\$20,000	\$80,000
6	Elizabeth Green	40	F	Lawyer	Anglican	Married	University	\$18,000	\$90,000	\$18,000	\$72,000
7	Thomas Black	25	M	Student	Muslim	Single	College	\$4,000	\$10,000	\$2,000	\$8,000
8	Sarah Grey	38	F	Writer	Hindu	Married	University	\$10,000	\$40,000	\$6,000	\$34,000
9	Michael Blue	42	M	Businessman	Sikh	Married	University	\$25,000	\$120,000	\$25,000	\$95,000
10	Linda Red	55	F	Retired	Buddhist	Married	High School	\$7,000	\$35,000	\$9,000	\$26,000

COARSEWOOL YEARLING TRAITS

Fleece and body characteristics of the coarsewool yearling rams and ewes are shown in Tables 25 and 26. Steady improvement has continued in all fleece traits. Fiber diameter was too fine in the 1962 group 16 ewes, however. There is a considerable amount of yearly variation in body weights, due to environmental influences. However, the general trend is toward heavier weights.

TABLE 25. BODY WEIGHTS AND SCORES OF COARSEWOOL YEARLINGS

<u>Year</u>	<u>Sex</u>	<u>Breeding group number</u>	<u>No. of sheep</u>	<u>Body weight (lbs.)</u>	<u>Body type score</u>	<u>Body condition score</u>	<u>Face covering score</u>	<u>Color score</u>
1959	Rams	16	13	111.7	2.82	3.06	2.50	1.46
	Ewes	16	30	89.9	2.93	2.76	2.07	1.63
		23	28	90.7	2.79	2.43	2.10	1.71
1960	Rams	16	15	139.6	1.90	1.92	1.68	1.27
	Ewes	16	32	91.8	2.66	2.60	1.49	1.47
		23	35	95.9	2.67	2.71	1.64	1.49
1961	Rams	16	20	125.7	1.96	2.05	2.20	1.12
	Ewes	16	37	93.9	2.37	2.65	2.66	1.28
		23	35	88.4	2.39	2.56	2.07	1.28
1962	Rams	16	15	132.0	2.05	1.94	2.13	1.61
	Ewes	16	24	93.1	2.13	2.20	2.60	1.35
		23	23	96.2	2.10	2.11	2.73	1.13

TABLE 12. MONTHLY MEANS OF TEMPERATURE, PRECIPITATION, AND RELATIVE HUMIDITY AT STATION 12

Year	Month	Temperature Fahrenheit	Precipitation Inches	Relative Humidity Percent	Wind Miles per hour	Clouds Tenths	Barometer Inches	Notes
1959	Jan	32.1	0.1	70.2	12.1	2	30.1	
	Feb	35.2	0.2	72.3	13.2	3	30.2	
	Mar	38.3	0.3	74.4	14.3	4	30.3	
	Apr	41.4	0.4	76.5	15.4	5	30.4	
	May	44.5	0.5	78.6	16.5	6	30.5	
	Jun	47.6	0.6	80.7	17.6	7	30.6	
	Jul	50.7	0.7	82.8	18.7	8	30.7	
	Aug	53.8	0.8	84.9	19.8	9	30.8	
	Sep	56.9	0.9	87.0	20.9	10	30.9	
	Oct	59.0	1.0	89.1	22.0	11	31.0	
	Nov	56.1	0.9	87.2	21.1	10	30.9	
	Dec	53.2	0.8	85.3	20.2	9	30.8	

TABLE 26. FLEECE CHARACTERISTICS OF COARSEWOOL YEARLINGS

<u>Year</u>	<u>Sex</u>	<u>Breeding group number</u>	<u>No. of sheep</u>	<u>Fleece weights</u>		<u>Staple length (cms.)</u>	<u>Fiber diameter (microns)</u>	<u>Outer- coat score</u>	<u>Percent medullated fibers</u>
				<u>Grease (lbs.)</u>	<u>Clean (lbs.)</u>				
1959	Rams	16	13	5.98	3.56	11.8	28.4	1.23	.04
	Ewes	16	30	5.89	3.30	10.2	24.6	1.62	.00
		23	28	5.82	3.28	8.8	23.1	1.26	.03
1960	Rams	16	15	7.85	4.08	11.9	30.7	1.41	.53
	Ewes	16	32	6.49	3.70	10.5	28.8	1.40	.40
		23	35	6.60	4.05	8.5	26.4	1.11	.02
1961	Rams	16	20	8.07	5.13	11.8	29.1	1.11	-
	Ewes	16	37	5.30	3.31	10.4	29.9	1.24	-
		23	35	5.64	3.37	8.9	27.6	1.07	-
1962	Rams	16	14	8.39	5.18	12.2	27.9	1.23	.05
	Ewes	16	23	6.28	3.73	11.4	24.9	2.01	.00
		23	23	6.12	3.77	10.4	27.8	1.61	.00

